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Coal Age

Volume 46 Number 7

Big cars and how they aid mechanical loaders is emphasized by two articles in this issue. V. D. Hanson, mechanical-mining engineer, Pittsburgh Coal Co., analyzes the advantage of an increased-capacity car with slight increase in weight and cites cost cutting details, p. 47. Ivan Given contributes toward the mounting facts and figures for big cars by describing the mechanized operation at Little Betty mine, p. 37, where output per man-shift, surface and underground, averaged around 19 tons in February of this year. . . . **Good conditions** are not essential to efficient production with mobile loading machines. Proof of this principle is afforded by experience at the Industrial mine in Colorado, where one loader and two shuttle cars make possible an output of 13 tons per man employed underground in barrier recovery under bad conditions. How the entire mine output comes from three to five barrier places will be told in an early issue. . . . **Dividends** naturally

(CONTINUED ON PAGE 7)

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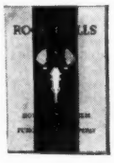

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FOR THE COAL MINING INDUSTRY

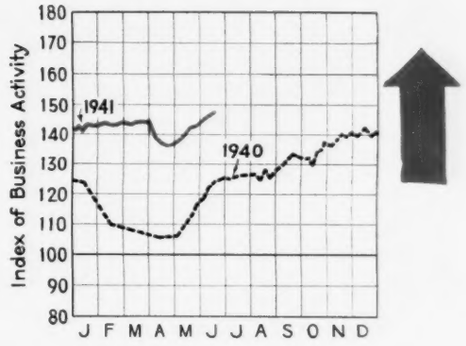
(CONTINUED FROM PAGE 5)

are the goal in any coal-mine modernization program. At Big Bend No. 1 stripping, in the Brazil Block field of Indiana, replacement of old steam stripping equipment with a 10-yd. electric dragline, plus relocation and modernization of the tipple and other improvements, has made this property a front-rank producer in the field. How it was done and with what results are found in the article beginning on p. 50. . . . **Fluid brakes** on monitor retarding machines cut costs and increase safety at Bergoo mines. With a minimum grade of 32 per cent, maximum 50, and an average of 40 per cent over an incline 2,175 ft. long, the control of two monitors in balance is a problem. How two mines of Pardee & Curtin Lumber Co., near Webster Springs, W. Va., solved the problem will be told soon in *Coal Age*. . . . **Maintenance efficiencies** have been increased by the Sinclair Coal Co., in centralizing a heavy-duty machine shop to serve eight producing mines. Though each mine still maintains its own shop, the growth of mechanical strip mining has brought larger type equipment which is too big for the ordinary mine shop to handle. This central shop is equipped for all kinds of machine work except stamping and shaping large plate. Charles Lambur tells his short story, p. 45. . . . **On pp. 72 and 73** will be found some informal snapshots of men at the mines, taken by *Coal Age*'s traveling editors. Ask them to snap you, next time.

HOW'S BUSINESS

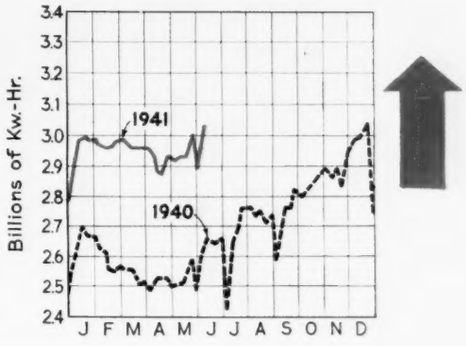
GENERAL BUSINESS CONDITIONS

With the national defense drive taking shape, production at all costs has become the dominant philosophy in Washington and plant expansion is the order of the day. Consumer-goods companies are the latest to turn to ordnance output, according to *Business Week*. The *B.W.* Index (June 14) has advanced to 149.2, compared with 148.3 a week previous and 142.6 a month earlier.



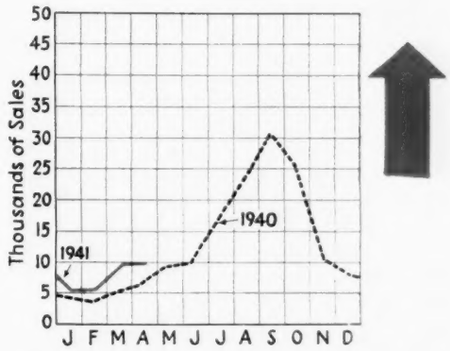
ELECTRICAL POWER OUTPUT

Energy production by the electric light and power industry, according to the Edison Electric Institute, totaled 3,042,128,000 kw.-hr. in the week ended June 7, an increase of 17.1 per cent over the corresponding week of last year. Output for other recent weeks was: May 17, 2,983,000,000 kw.-hr.; May 24, 3,012,000,000; May 31, 2,924,000,000 kw.-hr. Smaller gains reported in some regions were partly because of strikes and curtailment of use of electricity to meet shortage of power due to drought conditions.



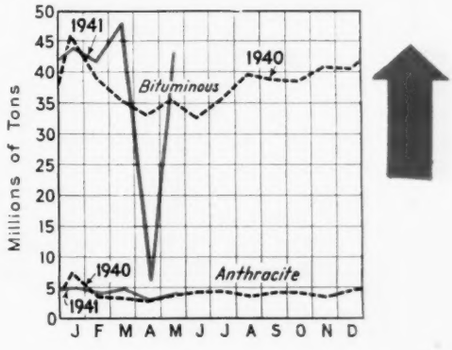
COAL STOKER SALES

Mechanical stoker sales in the United States in April last totaled 10,139 units (U. S. Bureau of the Census from 101 manufacturers), compared with 9,925 in the preceding month and 6,615 in April, 1940. Sales of small units in April last were: Class 1 (under 61 lb. of coal per hour), 9,366 (bituminous, 8,515; anthracite, 851); Class 2 (61–100 lb. per hour), 297 (bituminous, 267; anthracite, 30); Class 3 (101–300 lb. per hour), 254.

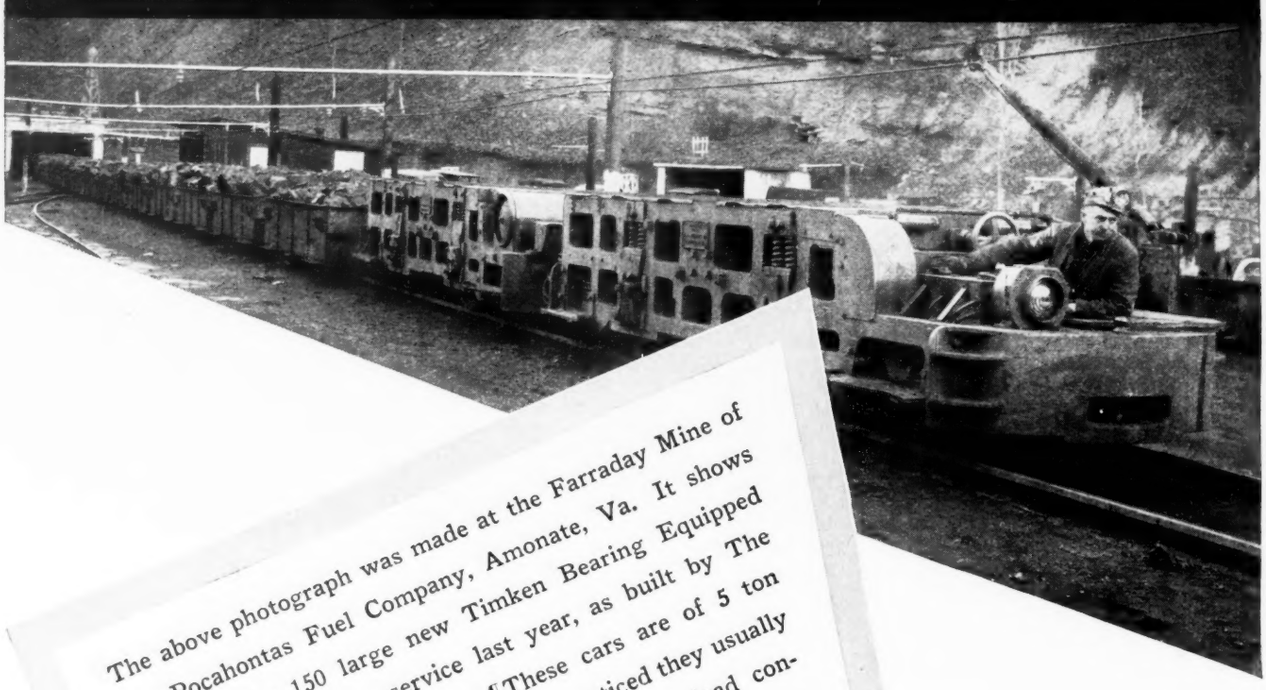


COAL PRODUCTION

Bituminous coal produced by United States mines in May last (preliminary) totaled 43,400,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior, which compares with 5,975,000 tons (revised) in the preceding month and 34,896,000 tons in May, 1940. Anthracite tonnage in May last, according to the U. S. Bureau of Mines, was 3,858,000 (preliminary), against 3,198,000 (revised) in the preceding month and 3,957,000 tons in May, 1940.



LARGEST CARS IN BITUMINOUS FIELD ARE EQUIPPED WITH TIMKEN BEARINGS



The above photograph was made at the Farraday Mine of the Pocahontas Fuel Company, Amonate, Va. It shows some of the 150 large new Timken Bearing Equipped mine cars placed in service last year, as built by The Bethlehem Steel Company. ¶These cars are of 5 ton capacity, loaded level, but as will be noticed they usually are highly cribbed, thereby increasing the load considerably. ¶The first Timken Bearing Equipped mine cars purchased for this mine went into service in 1925. They were large 4 axle type cars, 12 in number. These cars still are on the job and *not a single TIMKEN Bearing has had to be replaced.* ¶In these days of serious national emergency, when the productive capacity of the United States is being pushed to the limit, an ample supply of coal is a vital necessity. Timken Bearing Equipped cars and other kinds of mine equipment help to assure it.

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.

SYDNEY A. HALE, *Editor* • JULY 1941

Pertinent and Impertinent

• NATURE at times displays a sardonic impishness quite disconcerting to self-elected master planners for the human race. Her jokes are many, and drought is one of the driest.

• CANADA has declared all Dominion mines "essential services" to war defense and empowered authorities to proceed against persons impeding production or impairing efficiency of collieries. Washington, please note!

• VOCATIONAL TRAINING has done much to ease the shortage of skilled and semi-skilled workers in the defense industries. But a bottleneck due to lack of competent foremen is feared. Something here for the coal industry to consider and act upon.

• CONGRESS has specifically prohibited the use of RFC funds for financing the St. Lawrence, Passamaquoddy, Florida ship canal and Tombigbee waterway projects. Will it show the same sane determination if the administration turns on the heat for a separate appropriation for the St. Lawrence hydro-power seaway dream?

• NO OTHER industrialist has put up a harder fight against organized labor than Henry Ford. Yet, when an election returns an unmistakable majority for collective bargaining with CIO as the workers' spokesman, the Ford Motor Co. announces its intention "to go whole hog" in accepting the new situation. And signs a contract to make that announcement effective. There are others who might profit by this example.

• THERE seems to be a disagreement between authorities as to the adequacy of existing public-utility power resources. But there is no disputing the fact that coal will be called upon to carry a heavier share of the national power load in the coming months.

• "BUSINESS as usual" is out of the window, in the opinion of a number of spokesmen for defense agencies in Washington. Better, they argue, to abandon it now than to permit it to interfere with the defense program and so imperil its revival in the future. Business on the totalitarian pattern would be hardly pleasant to contemplate.

• DROUGHT already has compelled the rationing of hydro-electric power in some communities and threatens others. So the water enthusiasts want Uncle Sam to tap the public till again for more dam projects. Since Nature is no respecter of localities or man-made enterprises, the practical justification for such a move seems slightly obscure. Unless, of course, there is some hidden virtue in having still more communities suffer when the next drought comes.

• WE HAVE BEEN challenged! Commenting on a note in March *Coal Age* stressing the gratifying increase in tons per compensable accident at Pittsburgh Coal mines, *P. C. C. News* invites the editor "to fill his ink well and wipe off his pen for a new record." O. K. Make the record and *Coal Age* will be glad to tell the world.

• SUMMER is a favorite time for conventions. Jamming five such gatherings into a single week, however, makes it rather difficult for an ambitious coal man who might like to take in two or even three of them. Especially when the meetings are held at such widely separated places as Colorado, Illinois, Nova Scotia and West Virginia. If the Bituminous Coal Division can coordinate competitive prices, maybe associations might do a little harmonizing on convention dates.

Power and Defense

SO MUCH political water has gone over the dams since the federal government embarked on large-scale water-power development that discussion based on long-term economics has been practically flooded out. Today, according to Presidential proclamation, a national emergency exists. That emergency should make it imperative to weigh every step taken not in the light of some fanciful future benefits but in the light of the needs of the immediate present.

Applying this imperative in planning for increased power naturally suggests two prime considerations: speed in augmenting generating facilities and reasonable assurance of firm power from such expansion. That steam plants can be built more

quickly than hydro-electric projects can be developed is generally conceded. They also are subject to far less limitations as to location. On a comparable accounting system, costs, too, favor the modern steam generating plant.

Recent months again have shown what deficiencies in rainfall can do to hydro-electric power. In May, the average deficiency in stream flow in the eastern United States was equivalent, says the Geological Survey, to "a loss of one billion kilowatt-hours of electrical energy." In so far as this deficiency can be met, coal must take up the slack while carrying an increased load due to the defense program. TVA, which admittedly has had its load increased by defense demands, opened bids last month for a maximum of 4,100 tons of coal per day!

Despite these facts, advocates of further expansion of federal hydro-electric projects whip up their campaign. Flood control is no longer a cloak. The widely condemned St. Lawrence River proposal is trotted out in a national-defense disguise. Apparently the blackout of ordinary peace-time pursuits in the interest of the national emergency does not extend to pet political and social schemes.

Field for Study

TWO YEARS ago, in presenting its demands to the Appalachian Joint Wage Conference, the United Mine Workers gave management an outline of its objectives. These objectives were reiterated at the Columbus convention of the union last year and again at New York in the 1941 demands. Some of these objectives have been won in the new wage agreement. Those still unachieved, it is reasonable to assume, will be pressed in future negotiations.

Here, then, is a pattern of first things to be studied by an organization of operators such as was suggested in these pages last month. Some of the objectives may seem and may be fantastic. But none can be ignored or lightly dismissed. All should be examined carefully and earnestly in the light both of the economic position of the industry and of trends in other industries. Practices abroad, particularly in Great Britain, also should be studied.

Vacations with pay — which seemed so unthinkable to many operators a few short months ago —were granted in certain British coalfields before the outbreak of the present war. A guaranteed minimum weekly wage of £4 is a definite part of the British Miners' Federation agenda. At a meeting on May 14, labor leaders there decided to press this demand. Only an organization whose main function is fact-finding in the field of industrial relations can be expected to keep abreast of such trends. Without such an organization, management will continue to be at a disadvantage in labor negotiations.

Priority Progress

WASHINGTON is showing an increasing awareness of coal's importance to national defense. The danger, first pointed out in these columns some months ago, that the priority system might interfere seriously with adequate fuel production is now openly recognized by OPM. In several cases, individual priorities have been authorized to speed delivery of essential equipment to specific mines. But up to mid-June, OPM was still fighting shy of issuing any blanket priorities for the mining industry.

The nearest approach has been an order giving limited priority on materials and equipment for construction or repair of railroad, mine and industrial freight cars. Such priority is limited because it is subordinated to deliveries for military and other government needs. Moreover, it was issued not by OPM but by OPACS (Office of Price Administration and Civilian Supply). Efforts of the American Mining Congress and the National Coal Association to induce OPM to authorize a general preferential rating so far have been unsuccessful.

Meantime the system daily grows more complicated. During April and May approximately 85 new items or classes of items were added to the OPM Priorities Critical List. As of June 1, that schedule covered some 300 materials and classes of materials. This list "is a compilation of materials on orders for which Army and Navy contracting officers may automatically assign preference-rating certificates, thus assuring prompt delivery for military purposes." Over 60 of the items are used directly in coal mines or in the manufacture of coal-mining equipment.

Individual priorities, of course, help. But they are not the best answer. For one thing, it is not always possible to anticipate fully equipment requirements. If the machinery for manufacture—including assembly of raw materials or parts—cannot be set in motion until after a specific order has been placed, delay in delivery necessarily is lengthened. Should management be too forehanded in anticipating requirements, it risks being charged with unpatriotic hoarding.

What is needed is a more realistic attitude in dealing with the problem of coal and other industries whose productions, although not emerging directly as war matériel, nevertheless are essential to the manufacture of such matériel. OPM has taken this attitude in some cases—but not in coal. With fuel demands to support the defense program expanding, nothing which imperils coal production should be permitted.

One by One

MUCH the same process of liquidation is going on in the anthracite region as in Europe. Abroad nation after nation has been succumbing to a force which might not have had its present success had all the nations banded together from the first to confront the invader. In the anthracite region, the marauder is not Hitler but water. One by one mines are finding it unprofitable to operate because other mines have been flooded and financially liquidated. Central Pennsylvania has a similar, though fortunately less menacing, problem. It is time to consider the water problem and the need for cooperation in its solution before it is said of us as of the world as a whole: "Too little and too late."

HIGH MACHINE TONNAGE

Reflects Big Cars at Little Betty

Plus Fast Two-Locomotive Changing System

High - capacity track - mounted loading machines at Little Betty mine are given a real chance to do their stuff by the use of 6-ton cars, two-locomotive changing, and frequent track pick-ups to keep changing distance short. Consequently, they are able to average 550 to 600 tons per shift in 6-ft. coal, with the result that output per man-shift worked underground, including also a small surface force, was averaging 19 tons early this year.

By IVAN A. GIVEN
Associate Editor, Coal Age

CLOSE adherence to the basic principles governing service to loading machines is reflected in both high machine output and tonnage per man-shift at the Little Betty mine of the Little Betty Mining Corporation, Linton, Ind. With a 6-ton car, two locomotives behind each loader, frequent track pick-ups to keep changing distance short and operation of main-line trips into the working sections, normal output per loading-machine shift is 550 to 600 tons in room work in 6-ft. coal, while output per man-shift, surface and underground, averaged around 19 tons in February, 1941.

Little Betty is operated to augment the output of the Hickory Grove Coal Mining Corporation preparation plant, which receives the major part of its tonnage from the Minnehaha strip mine. Both Minnehaha and Little Betty recover the same seam (the Little Betty opening is in the final cut in one of the Minnehaha pits) and after it is dumped into the hopper at the preparation plant, the Little Betty coal is taken over by Hickory Grove. An outside tram road laid in the old strip pit connects the Little Betty opening with the plant, where the drop-bottom cars deliver to the same hopper as the tractor-semi-trailer equipment serving the stripper.

Length of the tram road, laid with 60-lb. rail, is about ¼ mile. Average grade against the loads is 1½ per cent; maximum, 1.9 per cent. Trip size, one 8- and one 10-ton General Electric locomotives before and behind, is 10 to 17 cars. Over the 1½-mile round trip to the working sections, the average is three trips per hour, including spotting empties and picking up loads.

Under the arrangement just described, Little Betty has no preparation plant. The average mine force is made up of 61 men. Seven of these are considered top men, including W. D. Roof, office manager, and two engineer-surveyors, who also handle the work at affiliated operations. The 54 men constituting the underground staff include Carl Donie, superintendent and mine foreman; Alfred Mielon, chief electrician, and William Woolsey, electrician foreman, who also work at other properties; and Rex Harbin and John Oniones, face bosses. With this staff, Little Betty averaged 1,152 tons per day in February with two production and one development machine working one shift each. Development-machine tonnage, depending on the extent of this work, ranged from 150 to 220 tons per shift. P. L. Donie is vice-president in charge of operations for Little Betty and affiliated organizations.

Average cover over the No. 6 seam at Little Betty is 80 ft. The seam includes two partings about 1½ in. thick, one, of rock, about 8 in. above the bottom, and the other, of shale or slate, about half way up. Over the coal in some sections is drawslate up to about 12 in. thick, which sometimes comes down with the coal and is gobbed. If not, it normally is taken down before permanent safety timbers (two rows of posts on each side of the

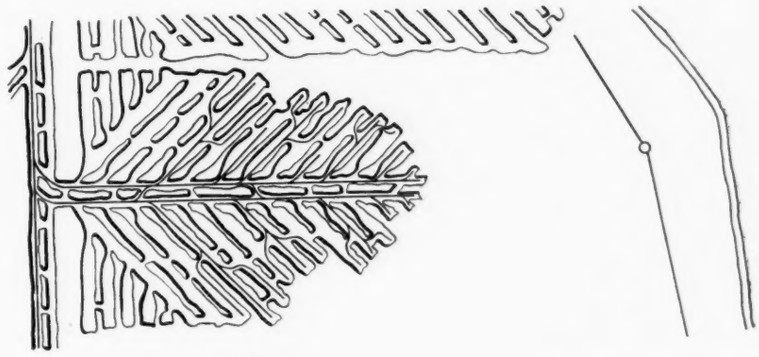


Fig. 1—Typical panel at Little Betty mine showing key room and pick-up system.

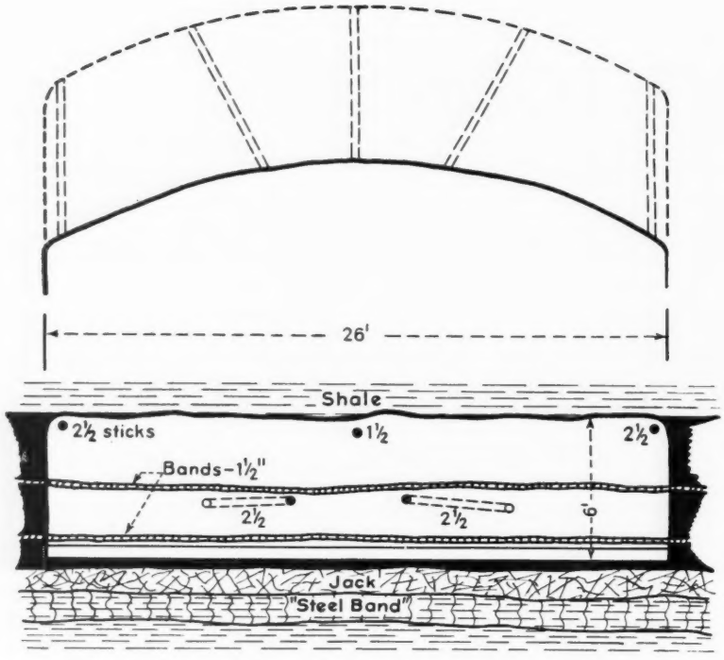


Fig. 2—Drilling pattern for a 26-ft. place. Headings are shot with two top holes and two rib holes under the parting.

track in rooms) are set. Over the drawslate, and coming down on the coal where it is absent, is a strong shale which makes a good top. Underneath the seam is a "jack" about 1 ft. thick followed by a "steel band" (limestone) averaging 18 in. Consequently, a good strong bottom is the rule.

Little Betty started producing Dec. 20, 1938, using small cars and Jeffrey 44-D loading machines from a former operation. Big cars were installed in August, 1939, and a Jeffrey L-400 track-mounted loading machine was acquired in January, 1940, followed by a second unit in July. These two machines, plus, normally, one of the 44-D's, handle the entire output, which, to date, has run as high as 1,385 tons. Maximum L-400 output in a shift has been 636 tons. Each L-400 is served by two 6-ton General Electric cable-reel locomotives. Other production equipment includes one Jeffrey 29-C bottom cutter, a second 29-LE unit, both with 7-ft. bars, and three Chicago Pneumatic 473 post-mounted drills (Hardsocg conveyor-type augers, heads and bits). The cutters are equipped with Cincinnati "Duplex" chains and bits. At the time this article was prepared, some 29,000 to 30,000 bits had been used in mining around 500,000 tons.

Cars are Sanford-Day "1-2-3" drop-bottom units. Originally purchased with the idea of eventual use in a thinner seam, the cars have been equipped with 10-in. sideboards, increasing their capacity to 6 tons. Inside dimensions are 6½ x 12 ft. Height over the rail (14-in. S-D "Floater" wheels, New Departure ball bearings) is 40 in. with the sideboards. Like the outside tram, the main line underground is laid with 60-lb. rail. Panels and rooms are laid with 30-lb. rail, using West Virginia steel ties at the face, where they reduce rail breakage and provide a more satisfactory base for loader and cutter operation. Other track equipment also is West Virginia. Water inflow is just slightly more than enough to keep the mine damp. Any excess, usually strongly acid, is pumped out through a borehole, using a Macbeth 5 x 6 lead pump with alloy cylinder liner.

Little Betty uses the panel system with rooms turned on a 45-deg. angle. The main entry is made up of two headings 12 ft. wide on 27-ft. centers. Panel entries, turned off each side of the main, also consist of two 12-ft. headings, in this case on 24-ft. centers. Running on these centers, which have been found ample in view of the light cover, making a crosscut is simply a matter of putting in a cut from each side.

Normal room width is 26 ft. Centers, at right angles, are 34 ft., leaving an 8-ft. pillar. Usual room depth is 300 ft. Neck width is 10 to 12 ft., and widening starts after about 12 to 14 ft. A 20-ft.-thick barrier is left between panels.

Entry-driving and opening up room territories is handled by 44-D equipment, which also is used to finish territories when the number of places gets down so low as to handicap the high-tonnage-production machines. Usually, a 44-D will advance the main and then start the panel entry, turning rooms and advancing them as occasion permits until at least 15 working places are available. Track, switches and other facilities then are gotten in shape and an L-400 takes over. Thereafter, the L-400 advances the

Cutting a room face with track-mounted machine.

entry and opens new places as required until the panel is nearly finished, whereupon a 44-D comes in to complete the job. A normal working territory for an L-400 is 15 or more places, for with fewer there is a strong possibility of it running out of coal.

Loading and most of the cutting is done on the first shift, with tamping and shooting on the second. A crew on the first shift is made up of a loader-operator and helper, two motormen, one triprider, two timbermen, who also handle drawslate and do other work as necessary, and three tracklayers. One cutting crew (two men) works during the first shift. A second crew, using the other machine, finishes up the cutting and does other necessary work at night. This system also has the advantage that if one cutter breaks down all the crew has to do is to go after the other, leaving the first for repairs. Drilling (three machines with five men) also is done at night. A sixth man tamps the holes, with assistance from the others when required. These men also do the shooting and then inspect the places to detect fires, if any should occur, and otherwise check on conditions. The places then are ready for loading on the next working day.

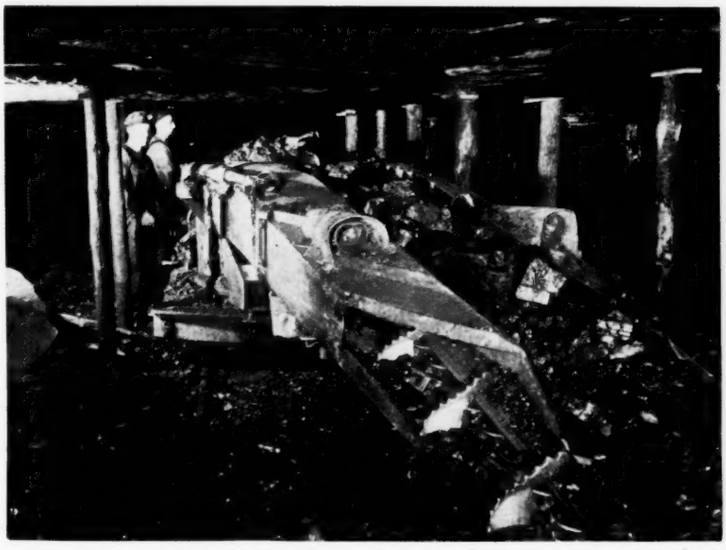
Cutting is done under the bottom band, and 26-ft. rooms are shot with five holes drilled from three set-ups approximately as indicated in Fig. 2. One set-up for one top hole is made on each rib. In the third, or center, set-up, the third top hole is drilled, plus two snubbers just under the middle parting. These snubbers are designed to break up and throw out the bottom bench, and the holes are angled right and left to split the intervals between the top holes. If places are not wet, the holes also may be slanted downward for additional kick.

Shooting is done with Austin pellet powder and Ensign-Bickford safety fuse. Fast Austin "X" is used in the bottom snubbers for maximum smashing and rolling effect, while slow "XXXX" is used in the top holes to bring down and crack up the upper bench. Usual hole loading is indicated in Fig. 2.

The 6-ton drop-bottom cars are changed by 6-ton cable-reel locomotives.

When coal loading starts the following day, after the necessary preliminary inspections, one of the timbermen goes ahead of the machine, in drawslate territory, to take it off the fallen coal and gob it along the ribs. He also handles any resetting or extension of timbering, taking down of slate, etc., that may be necessary, and at times may be helped by the second man. The latter, however, usually follows the machine, and when loading is completed, takes down drawslate, extends timber and otherwise sees to the safety of the place. He is followed by the tracklayers, and then cutting, drilling, tamping, and shooting take place in the manner that has been already outlined.

One room on each side of a center, or key, place is picked up about every other crosscut at Little Betty, as indicated in Fig. 1. Trolley wire is hung in past the switches, which makes it possible for the two reel locomotives to work without getting their cables crossed. In starting a turn at the loader, a locomotive runner takes three or four cars, and as he goes in he hooks his nip on at the changing switch. When he pulls out and goes in the changing track, the triprider who normally stays at the switch unhooks his cable, clearing the way for the second locomotive to go in. The first one then cuts off his load and, using his nip and pole, pulls back through the switch and down the straight track far enough to clear the second unit when it comes out. Other variations are possible, but



Loading machine at work in room.

Dumping a trip of cars at the Hickory Grove hopper, with strip haulage unit at the right.

hanging wire beyond the switch is the secret, as it permits the necessary cable unhooking and pole operation required. Otherwise, connecting all room tracks through the crosscuts would be required. While the changing units are making up a trip, the main-line units place empties in the nearest available place and then come in for the loads.

Little Betty is ventilated by a 5-ft. Jeffrey Aerodyne fan placed underground in the main intake opening. At present, driven by a 5-hp. motor, it is delivering around 50,000 c.f.m. The mine is non-gaseous, but Portable electric cap lamps are used for convenience and efficiency. All employees wear hard hats and safety shoes.

Power for the operation is supplied by two converter units set to supply about 260 volts when all equipment is running on the day shift. One 200-kw. G.E. unit at the drift mouth serves the haulage primarily on the day shift and all the mine at night. Inside power on the day shift comes mostly from a 300-kw. G.E. machine near the working sections. Its a.c. supply is received by means of a G.E. 3-conductor (No. 2 wires) rubber-covered cable suspended by strain clamps in a borehole.

Distribution underground is by means of a 4/0 trolley paralleled by feeders ranging in size from 500,000 circ.mil to 4/0. In addition to the track rails and Ohio Brass long steel-weld bonds, the return consists of one, two or three 4/0 bare wires. The L-400 loading machines and cutters are equipped with General Electric parallel-duplex cables (No. 2 conductors) with separate ground wires. Similar cables with No. 3 conductors are used on the 44-D equipment.

LOADER-CONVEYOR SLOPE

Of West Kentucky Coal Co.

Delivers to Washer Built at North Diamond

FOUR MONTHS after the start of slope sinking, 65 underground employees, including the six foremen, were loading mechanically and delivering by conveyors from face to tipple 1,600 tons per day from the No. 11 seam at North Diamond mine of the West Kentucky Coal Co., Earlington. A 300-ton-per-hour combination wet and dry cleaning plant added to the five-track steel tipple is one of few washing plants in the district. Plans call for mining 13,000,000 tons through the new slope, then opening another slope to get the remaining tonnage from the large acreage available and probably installing belt haulage on the surface from that slope to the preparation plant.

North Diamond is one of five active operations of the West Kentucky Coal Co., of which Hooper Love, formerly sales manager, is president, and Davis Reed, chief engineer. From the five mines the 1940 production was 1,500,000 tons. Up to the time of the opening of the new workings in the No. 11 seam, which is 6 ft. thick and is 78 ft. below the surface at the slope portal, North Diamond was producing 2,700 tons per day, hand loading, single shift, from the No. 9 seam, which is 5 ft. thick and lies at a depth of 168 ft. at the hoisting shaft. This No. 9 was opened in 1922, has been a consistent producer, and has a long life remaining. The company owns most of the surface of the North Diamond tracts.

Two consistent partings of crumbly pyrites, one ½ in. thick, 20 in. from the top, and the other 1½ in. and 24

in. from the bottom, make a cleaning plant a necessary adjunct for preparing that coal for an exacting market. The old tipple with its hand picking, which is fully adequate for the No. 9 coal, is continued in use for its original purpose during the day shift—during which time the cleaning plant is shut down. During the other two shifts, beginning at 3:30 p.m. and 11 p.m., both tipple and cleaning plant are in use preparing the No. 11 mechanically loaded coal. Ray Cobb, who has been superintendent of the North Diamond mine for many years, now superintends both seams.

The portal of the new slope is at a corner of the hoist house and its 48-in. 402-ft. (c.-c.) belt delivers directly to the main shakers in the tipple. The sinking, done by hand-loading the rock, was started in July, 1940, and the first coal was loaded out on the belt Sept. 23. Development into the No. 11 from the No. 9 hoisting shaft had been going on since June 21. Slope dimensions are 6½ x 15 ft. x 349 ft. long and the pitch is 16½ deg.

The first 115 ft. is concreted and from there down the roof support is steel timbers and creosoted 2½ x 12-in. oak lagging. Used track rails of 60- and 85-lb. weights constitute all of the steel. Side posts are single rails and the center posts are two rails arc-welded together. Throughout the upper half of the timbered section the sets are on 4-ft. centers and under the deeper cover are on 2-ft. centers. In addition to the belt conveyor, the slope contains a stairway 36 in. wide and a 44-in.-gage supply track. To protect the steel posts from the possibility of derailed supply cars, two 25-lb. guard rails are welded flush between them.

Room-mining production equipment at the time of this writing, when the

Mechanical loading, conveyor haulage from face to tipple, and a new wet-and-dry cleaning plant serve a new slope operation in the No. 11 seam at North Diamond mine, which for years produced exclusively from the No. 9, lying 90 ft. deeper. Although the No. 11 is 6 ft. thick, two crumbly partings had hitherto prevented its recovery. Shuttle cars have been added for development haulage.

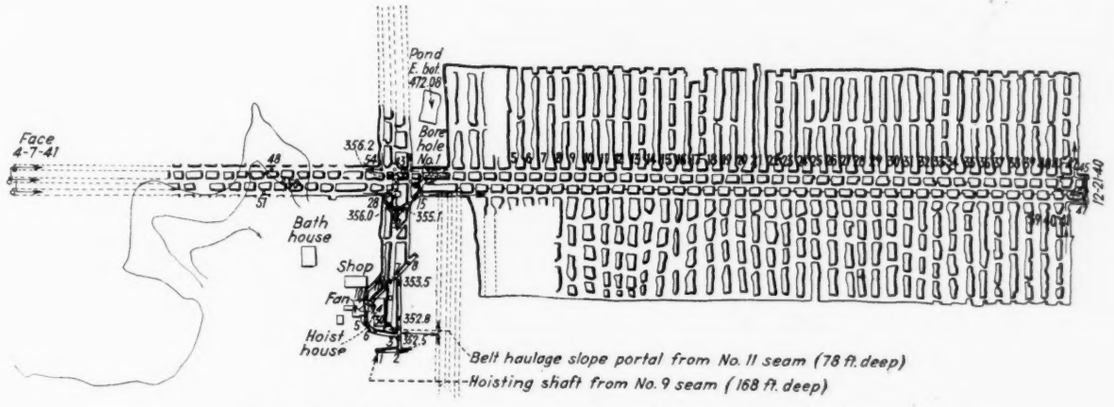
loading was 800 tons per shift, consisted of four Goodman automatic duckbills with 300-ft. pan lines, two Joy 14BU loaders, and four Joy 20-in. x 300-ft. 20-hp. chain conveyors. These discharge into a Jeffrey 30-in. cross entry belt 2,029 ft. long (c.-c.) equipped with 1,100 ft. of Goodrich "special mildew-proof" belting and 3,000 ft. of "mildew-resisting" Goodyear. This belt conveyor, now in use in the First Right cross entry, discharges to a 48 x 12-in. x 115-ft. (c.-c.) drag flight conveyor on the main entry which is extended over the top of a 100-ton surge bin. That arrangement allows a complete filling of the bin and eases the coal down a slope regardless of whether the bin is practically empty or nearly full.

Additional equipment on order and scheduled to be in use by the time this article is published includes two Jeffrey 30-in. cross-entry belts, a third Joy 14BU loader, and two Joy 6-ton shuttle cars with Philco batteries. The additional Joy loader and the two shuttle cars are intended primarily for development, which up to this time has been done by triple-shift hand-loading. The conveyors are identical with the first but the lengths purchased on this second order are 850 ft. and 1,500 ft. When the time comes for installing a belt on the main entry, which will extend 4,000 ft. from the slope bottom, the drag conveyor at the bin will be shortened to within 4 ft. of the discharge edge of the bin.

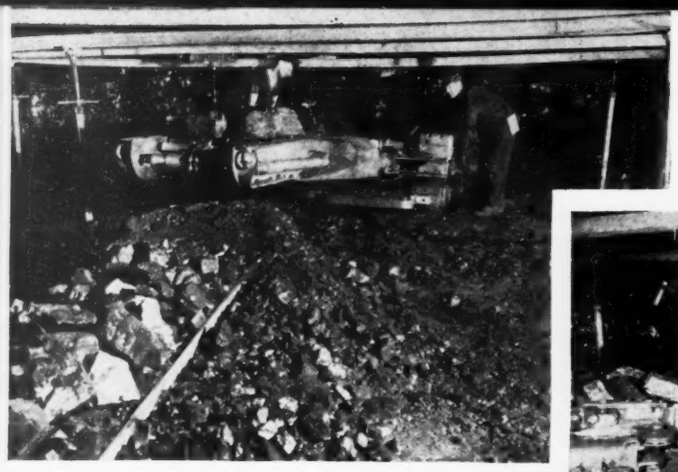
Rooms are driven 30 ft. wide on 45-ft. centers and 300 ft. deep off both sides of the triple-heading cross entry. Duckbill rooms have two crosscuts and Joy rooms have four crosscuts. Each Joy loads two rooms which are equipped with chain conveyors. Cross-entry headings are 14 ft. wide and the belt is in the center one. Crosscuts of the two chain pillars are opposite the adjacent room necks and are staggered with respect to each other. A supply track in No. 1 heading, which had been used with mules for hauling coal when driving the three headings of the First Right cross entry, is maintained as a supply track.

Between the coal and a very strong limestone top 4 to 6 ft. thick is a 5-in. "gob" material 95 per cent of which is held by room timbering. Bottom is a soft fireclay. Five crossbars supported by Simplex jacks are used at the face of each room for both duckbill and Joy loading. For the most part these are 4 x 5-in. x 20-ft. oak, but a few alloy steel H-beams 4 in. high x 20 and 25 ft. long also are in use. Permanent timbering in rooms consists of four rows of posts, each post with a 3 x 5 x 30-in. header. In the Joy rooms it is necessary to leave 8 ft. of roadway clearance between posts and one rib for loader travel. Water influx is a minor problem. Four 3-hp. centrifugal pumps have sufficed to date. No gas has been detected in the mine. Miners use Edison Model P cap lamps.

All equipment underground operates from 220-volt a.c. power but the



New workings in No. 11 seam, North Diamond mine, showing the slope in relation to the hoist house of the No. 9 seam.



Left—Mobile loaders work 30-ft. rooms and discharge to flight conveyors.

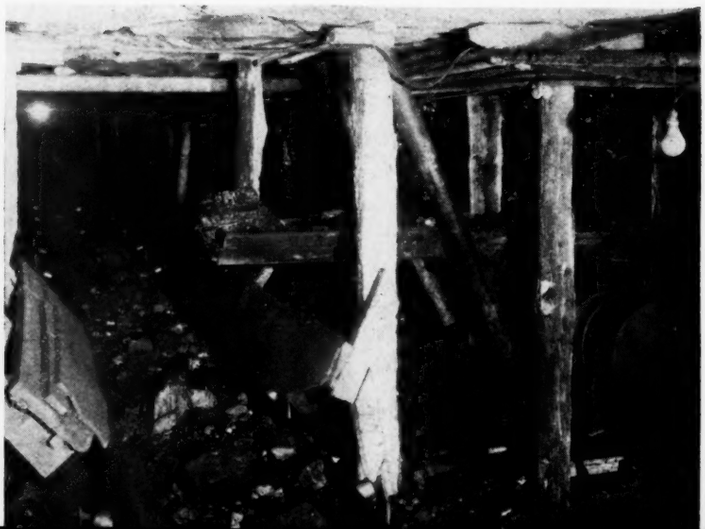
Above—This machine is loading a flight conveyor positioned on the center line of the room.

Upper left—Four rooms are worked with self-loading conveyors.

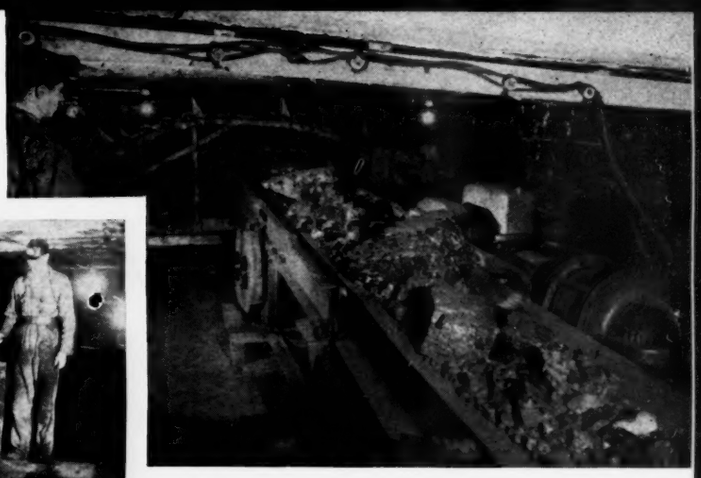
Lower left—New 220-volt a.c. undercutter at work.

Bottom left—T. C. Stokes, assistant chief electrician of the company, notes the full load of the flight conveyor which is receiving coal from a mobile loader.

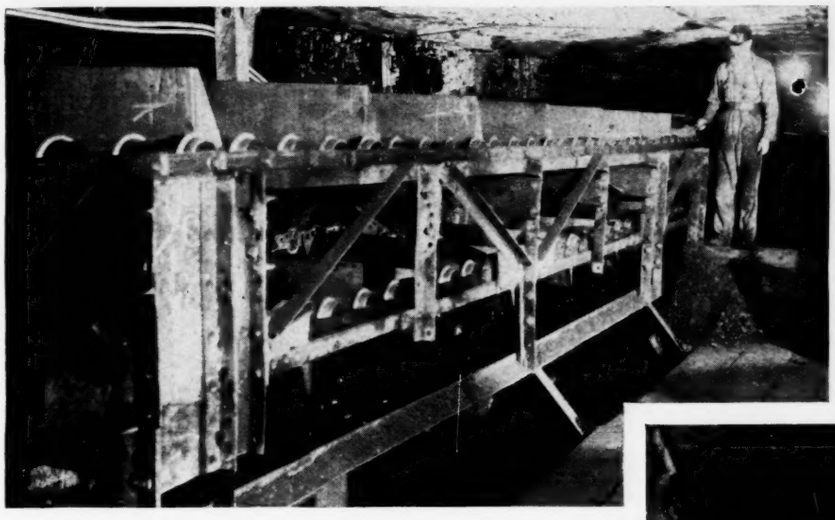
Bottom right—Discharge of a self-loading conveyor to the cross-entry belt.



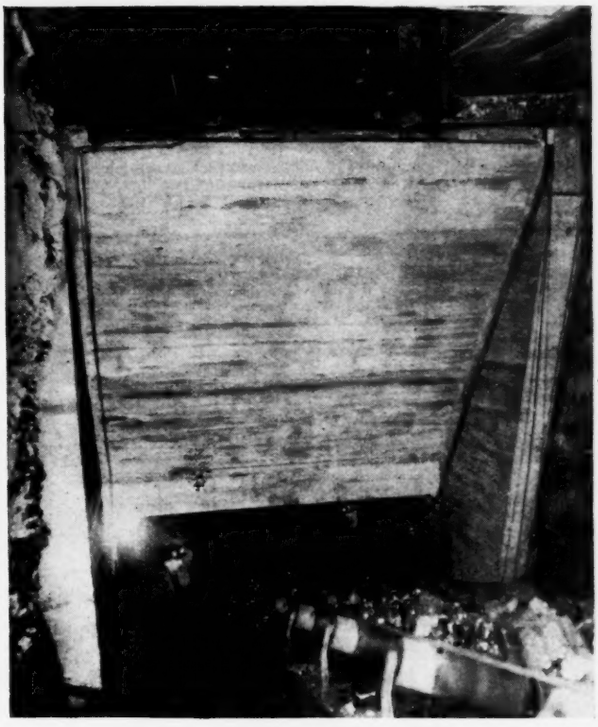
Right—In background, the drag conveyor which is moving the coal from First Right cross-entry belt toward the left to the underground bin.



Below—Spanning the top of the bin, this drag fills it to level without any dropping.

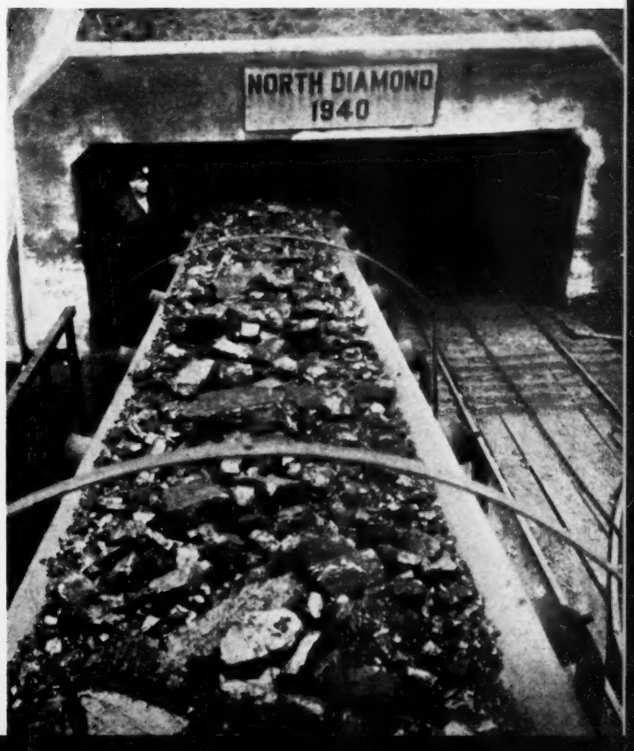


Below—Drag conveyor and its motor, 100-ton underground bin, plate feeder and slope belt conveyor.



Below—Looking down the slope from a point 175 ft. from the bottom.

Right—With satisfaction, Ray Cobb, superintendent, contemplates the silent flow which has increased by 1,600 tons the daily output of North Diamond mine.



Below—Down 115 ft. from the portal the concrete ends and the steel begins. Posts are protected by flush welded guard rails (lower right).

cutter equipment includes four old Goodman 12AA shortwalls which originally were d.c. and for this job were changed to a.c. by purchasing new Goodman motors for them. Two of the a.c. cutters are Sullivan 7-B Super Shortwalls. Cutter bars are 9 ft. long and the bits are standard type with points plated with Stellite. Drilling is done with four Jeffrey A6 post-mounted units. Auxiliary ventilation equipment for each duckbill room consists of a Brown-Fayro 12-in. blower and 300 ft. of duPont Ventube.

Shooting is done with duPont Lump Coal C. in sticks 1¾ x 6 in., 100 sticks per box, and the production is 8½ tons per pound. Five holes are drilled per 30-ft. face. Four of these are started just above the upper parting and pitched up toward the top and one is drilled level in the center at a height just above the lower parting. The two upper holes, which are started at points 3 ft. each side of the center line, are angled out toward the ribs as well as pitched upward. Three sticks of explosive are used in each rib hole and two each in the others.

Belt Loaded by Feeder

A reciprocating plate feeder at the bottom of the 100-ton underground bin places the coal on the slope belt. This 48-in. belt—total length 800 ft. and having splices vulcanized—is a Goodyear 6-ply 32-oz. duck with $\frac{3}{16}$-in. rubber on the carrying side and ⅛ in. on the other. Timken roller bearings are used in the troughing idlers, 60 per cent of which are Webster and 40 per cent Stephens-Adamson. The belt is driven at 221 f.p.m. by a 35-in. lagged head pulley around which the belt is snubbed by one of the three pulleys of a gravity take-up. The power unit is a 50-hp. 220-volt General Electric Type MT 1,150-r.p.m. motor and a DeLaval Type 52B worm gear reducer having a ratio of 7.6.

The new 300-t.p.h. mechanical cleaning plant, installed and put into service under the direct supervision of F. R. Buckley, assistant chief engineer, uses a Menzies hydro-separator on the 6 x 1¼-in. and 1¼ x ¼-in. sizes, and three American Type RA 6 x 14-ft. reconditioned air tables for the ¼ x 0-in. Preliminary to the cleaning, two new Nordberg-Symons 4 x 14-ft. vibrators driven by General Electric 10-hp. motors separate the ¼ x 0-in. from the 1¼ x 0-in.

Along with the installation of the cleaning plant a 30 x 36-in. crusher for breaking mine-run, lump, egg or nut was added to the tipple. It is installed on a ground foundation and is served by a drag flight conveyor extending from car loading booms to one side of the tracks where there is higher ground. Sizes regularly prepared by the tipple and cleaning plant, and expressed in inches, are: 6 x 4, 6 x 2, 4 x 2, 2 x 1¼, 1¼ x ¾, ¾ x ¼, and ¼ x 0. A washed stoker coal is one of the specialties.

Markets for the North Diamond coals are principally domestic, though the steam market does absorb a large percentage. In a building close by the cleaning plant the company maintains a central coal-testing laboratory, with Alexander Fleming, chief chemist, in charge.

As previously mentioned, 220-volt a.c. is the power chosen for the underground belts, room conveyors and face equipments. That same voltage is used on the tipple and preparation-plant motors. Power is purchased and the service transformers are nominally 11,000 to 220 volts. Actual voltage at the three 150-kva. transformers at the top of a borehole supplying the main unit of the underground production equipment is 268. Principal loads on this borehole feeder total 480 connected-horsepower made up of four 20-hp. motors on room flight conveyors, four 20-hp. on duckbills, six 50-hp. on mining machines, and two 30-hp. on Joy loaders. Linestarting of the 50-hp. motors of the 7B cutters draws a heavy current which produces a large voltage drop of short duration.

Condenser Saves the Day

Although three 750,000-cir.mil feeders are used in the borehole and six 500,000-cir.mil cables from the borehole bottom to the room necks, some difficulties from excessive drop were at first experienced. Original plans call for a length limit of 1,400 ft. for this type of 220-volt transmission. Sherman Melton, chief electrician and originator of the Melton system of automatic power-factor control (*Coal Age*, February, 1928, p. 75), made tests with a graphic meter which showed that low power factor of the underground load was a principal factor causing the low voltage. It ordinarily ranged from 55 to 70 per cent and reached 80 per cent only during instantaneous peak loads.

To correct the condition a 225-kva. synchronous condenser has been installed underground on the First Right cross entry at a point 1,200 ft. from the main. This condenser was formerly a 150-hp. 2,300-volt motor of a substation motor-generator set. The winding was reconnected to provide 230-volt operation. An automatic regulator for the exciter field current of this motor is planned. Power factor at normal loads ranges between 90 and 95 with this synchronous condenser in use.

Connected load of the slope-bottom equipment and slope conveyor belt totals 225 hp., as follows: slope conveyor, 50 hp.; two 30-in. entry belts, each 50 hp.; drag flight conveyor topping the bin, 25 hp.; and plate feeder, 20 hp.

Interlocks Are Provided

Westinghouse De-Ion starters are used on duckbills and chain conveyors, and to each working face extension cords are provided to start and stop these conveyors. If the drag conveyor or the cross-entry belt stops, that automatically stops the room conveyors. The interlocking between cross-entry belt and room conveyors is by individual General Electric roller switches on the belt near each room unit discharge. Each roller switch is on a frame which by means of clamping screws can be quickly detached and reinstalled when room conveyors are moved.

Carel Robinson, Robinson & Robinson, Charleston, W. Va., was the consulting engineer for this No. 11 seam project.

Men Employed in Mining and Delivering 800 Tons Per Shift to the Tipple

	Shift beginning at 3:30 p.m.	Shift beginning at 11 p.m.	Off-shift	Total men
No. 1 Joy crew	7	7	..	14
No. 2 Joy crew	7	7	..	14
Two duckbill crews	7	7	..	14
Shift electrician	1	1	..	2
Shift electrician helper	1	1	..	2
Foreman	1	1	..	2
Section foremen	2	2	..	4
Bottom man	1	1	..	2
Men oiling belt conveyor and inspecting equipment	2	2	..	4
Brattice man	..	..	1	1
Handling supplies	..	..	4	4
Off-shift electrician	..	..	1	1
Off-shift electrician's helper	..	..	1	1
Grand total				65

SINCLAIR COAL COMPANY

Increases Maintenance Efficiency By Machine Shop Serving Eight Mines

By CHARLES LAMBUR JR.
Assistant Editor, Coal Age

A CENTRAL machine shop serving the Tiger mine of the Hume-Sinclair Coal Mining Co. and doing considerable work for the Oklahoma, Missouri, Illinois, Kentucky and Alabama properties which are managed by officials of the Sinclair Coal Co., Kansas City, has been constructed at the Hume-Sinclair mine, Tiger, Mo. Each mine still maintains its shop, but heavy work, which in the past was sent out, now is done at this central machine shop. The continued development and growth of mechanical strip mining has brought increasingly larger equipment, repairs and changes in design of which are too big for the ordinary mine shop to handle.

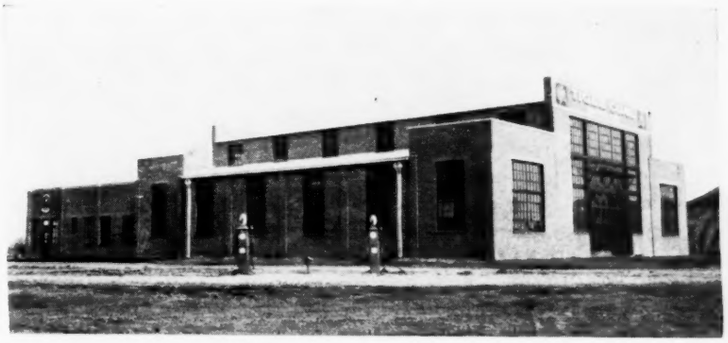
This new shop is equipped for all types of machine work except stamping and shaping large plate. Dipper sticks, truck trailers and engines, tipples and washers are rebuilt and repair parts made and general heavy maintenance work accomplished. Since October, 1940, when the shop began operation, two 10-, three 15-, two 20- and three 25-ton semi-trailers have been designed and built with Mayari-R steel, a set of Marion No. 5320 shovel dipper sticks has been rebuilt, a horizontal bank drill has been made, and specially designed equipment, such as cable reel for electrically operated caterpillar, developed.

The building was erected by contract and equipment placed by the coal company. It is 100x150 ft. with an office and supply room occupying 50x100 ft. across one end. The remainder is a 100x100-ft. shop made up of three 50x100-ft. north-south bays at right angles to the office and supply room. The west bay is for automotive, electrical and machine work, and the east for structural steel and welding, and has a cinder floor. The west and center bay have a concrete floor. The center is for dismantling and assembling equipment by a Whiting 20-ton electric floor-operated traveling crane.

The building is made of 5x12-in. tile and brick. Side walls are 20 ft. high and contain 10-in. H-columns on 16-ft. 8-in. centers supporting the structural-steel roof frame. The center bay rises 10 ft. above the others and 18-in. 20-ft.-long H columns on 16-ft. 8-in. centers support the traveling crane and 10-in. H columns extend to the roof frame.

The roof is Johns-Manville asbestos composition, chosen not only for safety and wearing qualities but also because of insulation to outside temperatures. Five E. K. Campbell fan-type steam-heating units warm the shop to 60 deg. at 10 deg. below zero F. Two more units are in the supply room and one in the office. Natural light enters by 1,400 12x18-in. glass panes and artificial light is furnished by 32 roof lamps and reflectors. Ten 300-watt lamps are in the center bay and the remainder are 150-watt lamps in the side bays. All wiring is in conduit, and power, transformed at the building, is 440 volt a.c., except for the 110-volt light circuit.

Equipment in the west bay consists of a Fitchburg ½- to 8-in.-diameter and 1- to 20-in.-long cylindrical grinder for piston work; Heald No. 55, 2- to 10-in.-cylinder motor block grinder, etc.; Black & Decker valve facing machine for minus to ⅝-in.-diameter stems; compressor and ¼-in. hose and nozzle for spraying and cleaning engines with coal oil or for painting; five sets of oxyacetylene torches; four 400-amp. Lincoln Electric welders; 600-ton hydraulic press; Mitts & Merrill ⅛- to 2½-in.-wide by 20-in.-long key seater; Lodge & Shipley heavy-duty 24-in. (will handle 26-in.) 7-ft.-bed quick-change-gear lathe; Leahman 16-in. (will handle 18 in.) 8-ft.-bed quick-change gear lathe; Atlas 10-in. 3½-ft.-bed bench lathe; Atlas ½-in.-diameter drill press; Niagara foot-operated 16-gage-iron-capacity drop shear; coil winding machine, and several steel work-benches and vises and individual steel tool cabinets for lathe oper-

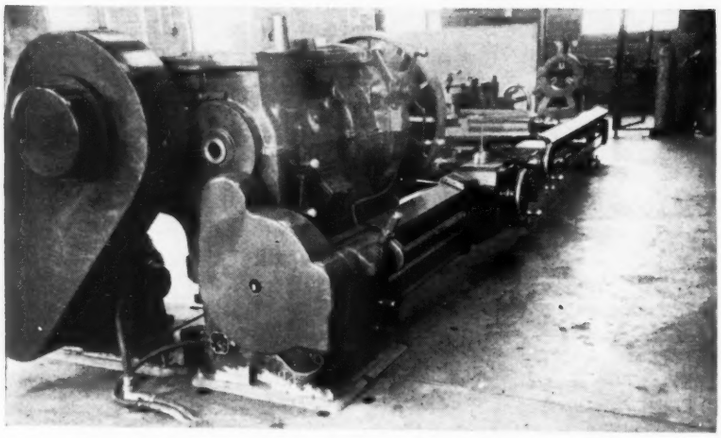


View of the machine shop from the southwest.

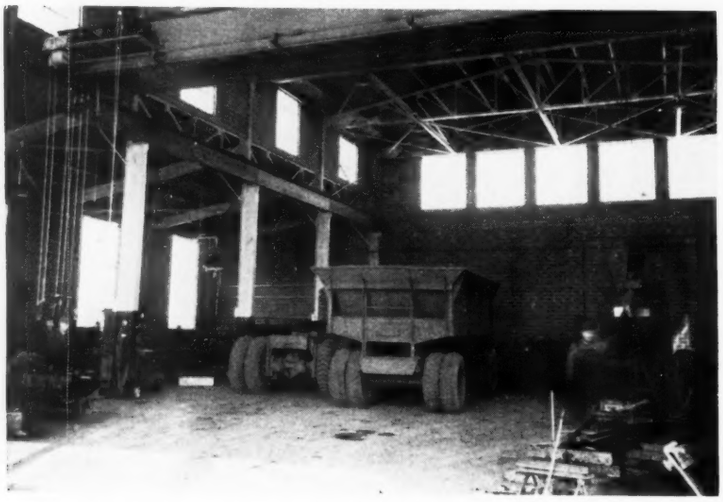
ators and sheet-metal screen shields.

Automotive work is done in the south and electrical work (making coils, rewinding motors, etc.) in the north end of this bay. Across the north end of the center bay is a

Part of west bay showing two lathes and electrical department in background.



A heavy-duty 30-in., 18-ft. bed, quick-change-gear lathe having 4- to 255-r.p.m. spindle speed and able to cut 56 different pitch threads from ⅜ of one thread to 46 per inch.



Center bay is equipped with 20-ton electric floor-operated traveling crane.

LeBlonde heavy-duty 30-in. (will handle 34-in.) 18-ft.-bed quick-change-gear lathe with taper attachment and chasing dial. Spindle speed is from 4 to 255 r.p.m. and 56 different pitch threads ranging from ⅜ of 1 thread to 46 threads per inch may be cut.

Equipment in the east bay includes a Rex 10-kw. 25-amp. 440-volt spot welder with water-cooled electrodes that can make 500 welds per hour on 18-gage steel; two Cincinnati grinders each with two 2-in. face 12-in.-diameter emery wheels and two grinders each with two 1-in.-face 8-in.-diameter emery wheels; Muehler Radial ⅛- to 3½-in. drill press that can make larger holes by use of a fly-boss; Peerless and Armstrong-Bloom hack-saws for 8x12-in. and 6x6-in. steel; Oster-William combination bolt and pipe-thread cutter for ¼- to 1½-in.-diameter bolts and ⅛- to 2-in.-diameter pipe; Oxweld 100-cu.ft.-per-hour acetylene generator and oxygen manifold and pipe to twelve welding stations; home-made 5-ft.-bed vise for bending and shaping sheet steel and steel benches, vises and cabinets. Additional equipment on order includes 28- to 30-in. shaper, No. 4 or 5 milling machine with indexing head and a 60-in. gear cutter. All equipment is motor-operated except as otherwise mentioned. Both the east and west bays will be equipped with 2-ton traveling cranes.

Well-equipped Storeroom

The 50x70-ft. supply room has 864 15x15x24-in. steel bins plus open storage space and is lighted by 26 100-watt lamps and reflectors. Floor is concrete and a cyclone 4-ton traveling hoist is used for lifting heavy parts. All portable tools, including riveting and chipping hammers, air guns, electric hand drills and grinders, and a radiograph are kept in this room. The Airco-DB No. 10 radiograph, 110 volts a.c./d.c., travels on a track and can cut any degree angle or a circle by one or two torches.

Average day-shift employees are 24 plus a stock clerk and foreman. There are four workers on the second shift and three at night, at which time the watchman is the stock clerk. Supplies are card-indexed with a record of each incoming and outgoing item. Each part must be requisitioned by the foreman and each job carries a shop order number to which individual cost is charged. By systematization, idle machine time, amortization and over-all cost of operation are kept at a minimum.

BIG MINE CARS

Raise Efficiency and Cut Costs By Improving Haulage and Aiding Loadings*

Practical evidence of the benefits to be derived from big mine cars is provided by a recent installation at a mine of the Pittsburgh Coal Co. With a design providing a major increase in capacity with only a slight increase in weight, these cars have increased loading-machine output, raised tons per man, and cut costs. The details of the new car and an analysis of its advantages are presented in this article by Mr. Hanson.

By V. D. HANSON
Mechanical-Mining Engineer
Pittsburgh Coal Co.

GETTING coal from the face to the tipple is a major item in production cost. Therefore, it is sound policy to check into the type of car used and its effect on haulage. All factors considered, it is important to get the most car for the least cost. Hauling small cars does not pay. During the last 15 years, mine cars with level-full capacities of 45.5 to 175 cu.ft. have been used by the Pittsburgh Coal Co. Recently, a number of cars with a capacity of 198 cu.ft. level full were installed.

In hand loading, substantial savings in section costs and increased concentration of work have been made possible by larger cars. Even in conveyor mines, though small cars may be loaded in trips, larger cars are desirable because they result in sidetrack, motor, and equipment savings. For a mine using mobile loaders, where one car is placed for loading at a time, maximum capacity for given over-all dimensions is essential.

Specifications for various cars in use at Pittsburgh Coal Co. mines exclusive of the latest type, are listed in Table I. The ratio of level-full capacity to weight is an interesting item. This information is plotted in Fig. 2, and it will be noted at the lower left that no trend is discernible. Even in the small wood cars there were features that permitted larger payloads per cubic foot. It also is notable that there is a decided trend in the relationship of car weight to level-full capacity in the composite group. In the steel group, cars evidently are influenced more by location of the metal for greatest stress-carrying capacity per cubic foot in relation to weight than in other types.

Adding the average coal weight when hand-loaded to the data in Fig. 2 gives the comparison illustrated in Fig. 3. In the cases of the last two cars, there is a decided difference in pay load in relation to dead load. The *U* car weighs 115 lb. less than the *T* car, but carries almost 50 per cent more pay load. At the other extreme, Fig. 3 shows that with the smaller wooden cars loaded weights are very erratic in comparison to level-full capacities. The design (whether benched or not) in combination with small widths and lengths controlled the "graveyard hump" applied. In all types of cars, that part of the load which can be put on without having to pay in excess dead weight for a structural band, box or collar is indeed the cheapest coal-hauling factor. Therein design is important.

The specifications for cars used at some of the company's mechanical-loading mines, including the newest type, are given in Table II, along with machine- and hand-loaded weights. The loss due to mechanical as compared to hand loading runs as high as 10 per cent. In certain instances, the difference amounts to ¼ ton per car and becomes a big cost item. We have found that with the larger cars the weight of a cubic foot of loose coal is 10 per cent less at the start of a long haul than at the end. This is to be expected, but the car built to permit direct vertical coal-loading on projection-free sides and bottom is the car to use.

Table II includes a comparison between horizontal, vertical and total displacement, considering the car as a solid block. This gives us a ratio of displacement to pounds of coal per car. In considering the ratio of payload to deadload it will be noted that the 198-cu.ft. car is by far the best. When seam height is considered, the 40 lb. of coal per cubic foot of displacement is vitally important.

The comparative values of certain parts of Table II are shown graphically in Fig. 4. When cubic capacity in relation to car weight is compared to Fig. 3, it is noted that, with the 198-cu.ft. car, 200 lb. more car weight provides 1,000 lb. more coal weight than with the 176-cu.ft. car, a noteworthy spread in coal weight with a very small spread in car weight.

At the mine where the new cars are in use, a 20-ton main-line locomotive pulled a regular trip of 60 of the old-type cars weighing 249,000 lb. and holding 300,000 lb. of coal—total weight, 549,000 lb. With the new cars, a 34-car trip represents 374,000 lb. of coal and 173,400 lb. of cars, or a total load of 547,400 lb. Therefore, 74,000 lb., or 37 tons, more coal is

* Abstracted from a paper presented before the Pittsburgh (Pa.) Section, American Institute of Mining and Metallurgical Engineers.

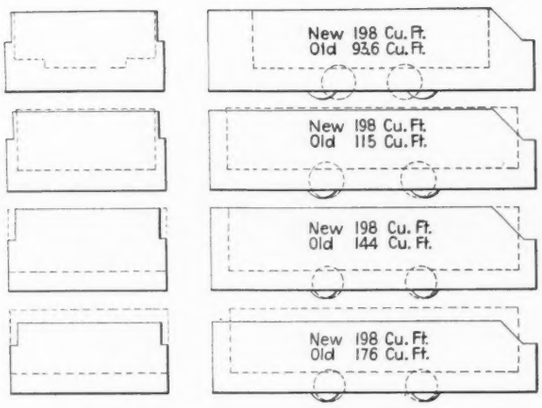


Fig. 1—New car compared with certain old cars.

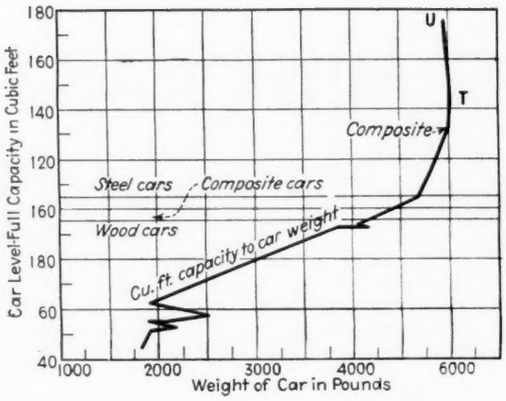


Fig. 2—Ratio level-full capacity to car weight.

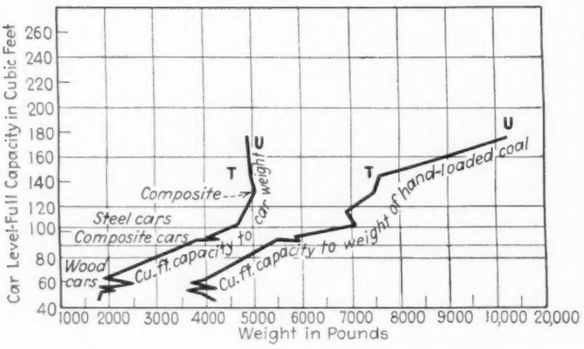


Fig. 3—Ratio level-full capacity to coal weight.

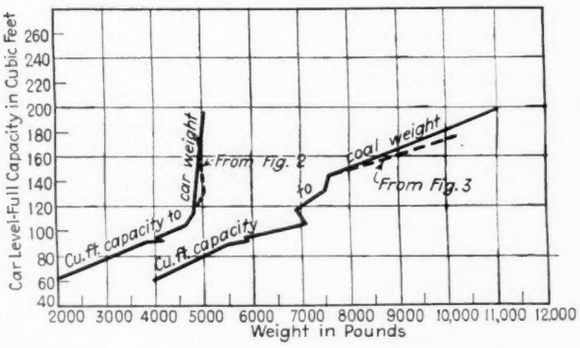


Fig. 4—Ratio capacity to car and coal weights.

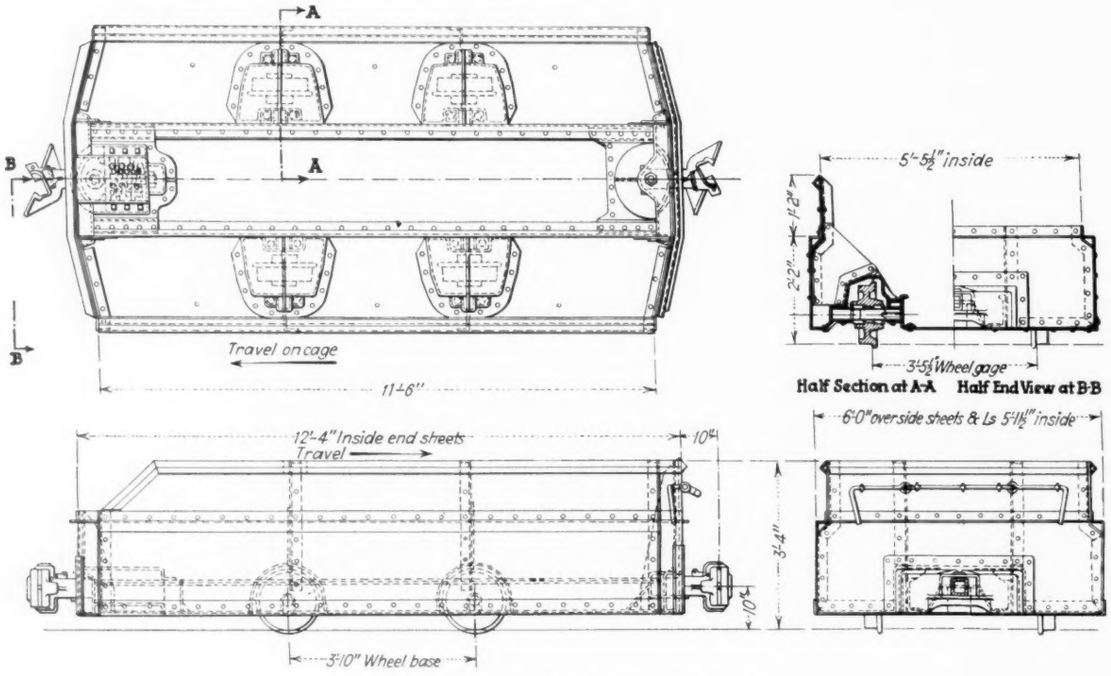


Fig. 5—Construction details, new 198-cu.ft. car.

hauled with the same power expenditure. When considered in connection with empty mileage, the saving over a year's time is a substantial figure. The 60-car trip was about 660 ft. long; the 34-car trip, 476 ft. It can readily be seen that a real saving is possible in sidetrack and parting construction where trip length is the determining factor.

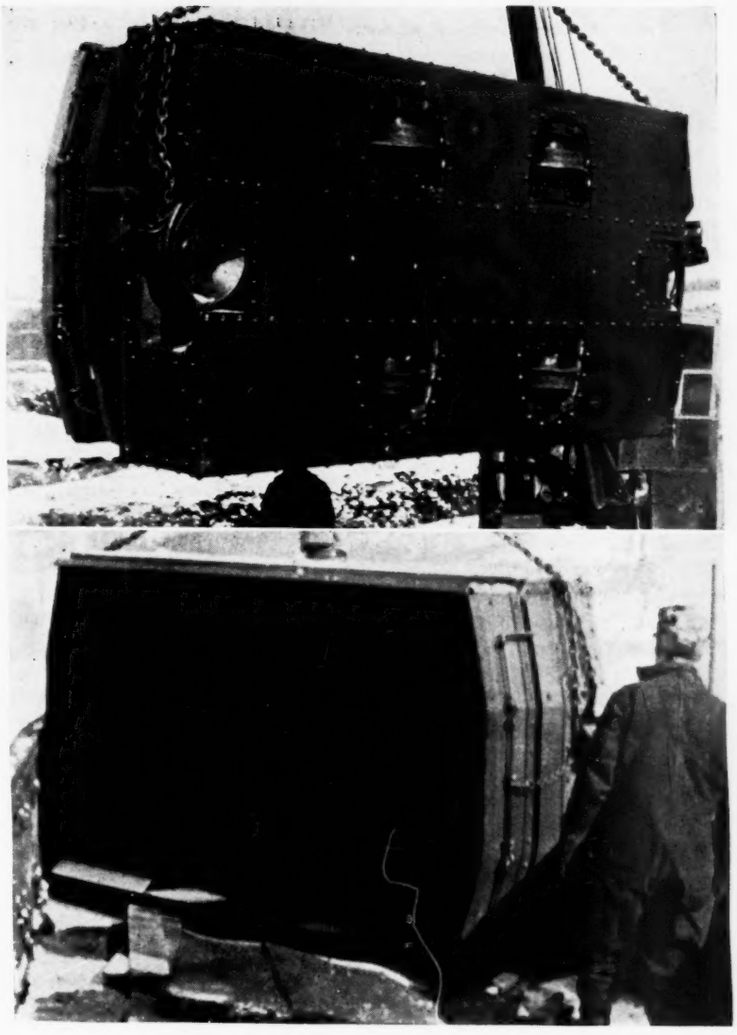
The new car (Fig. 5) is made with an obstruction-free bottom and without offsets. Comparisons of the new car with several old cars are shown schematically in Fig. 1. Stub axles are used and no space is lost in axle housings. One end is dropped to permit better end-on loading. The ends are vestibuled for negotiating short turnouts and also to make it safer for the snapper. Automatic couplers, operated by chain and bellcrank, keep the snapper erect and safe. The main members are two 8-in. bulb angles weighing 22.3 lb. per cubic foot. These run the full length of the car and are its backbone.

The method of attaching the malleable-iron wheel hoods to the bulb angles by rivets through the casting and web-and-gusset connections to the bottom and sides is shown in half-section A-A, Fig. 5. The car is equipped with automatic couplers housed in steel castings fastened over the ends of the bulb angles, into the bulb-angle flanges, and into the bottom sheets. Thus, the stresses due to haulage are carried by this stiffened flat girder. One coupler is spring-equipped and designed to permit rotary dumping without uncoupling. A car-haul lug is incorporated in the bumper casting.

Chains Replace Brakes

No brakes are provided. Instead a ¾-in. BB coil chain with a large ring at one end and an open grab hook with handhold at the other is used. The chain is passed under the rail and looped over a tie, using the ring. The hook usually is slipped over the side sheet of the car. Chains are located permanently in all working places and at sidetracks, partings, and various make-up or passing places.

Side and end sheets are ¼-in. copper-bearing plate, with 5/16-in. copper-bearing plate in the bottom. A 3-in. Z-bar (9.8 lb. per foot) provides lateral stiffening on each side and also acts as a dump rail. For this reason, the car comes down to within 3½ in. of the top of the track rail. All indications show that with high-



Two views of the new 198-cu.ft. steel car.

tensile steel, cost increases about 5 per cent on this type of car. The saving in weight with the same strength amounts to 12 per cent. Or, with the same car weight, a 50-per-cent longer life may be expected.

The 14-in.-diameter rolled-steel wheels on 490 of the cars are

Table I—Specifications for Various Cars at Pittsburgh Coal Co. Mines

Mine	Car-Level, Cubic Feet	Weight of Car	Average Weight of Coal — Hand-Loaded	Length Over Bumpers	Over-All Width	Over-All Height	Hand Loading	Mechanical Loading	Construction: Wood	Composite	Steel
A.....	45.5	1822	4227	8′ 2″	49″	49″	X		X		
B.....	51.8	1900	3874	8′ 8″	54″	48″	X		X		
C.....	52.7	2150	3695	8′ 5″	53½″	48⅝″	X	X	X		
D.....	55.7	1900	3838	8′ 5″	49½″	48⅝″	X		X		
E.....	55.7	1900	4123	8′ 8″	52½″	55⅞″	X		X		
F.....	57.5	2100	3515	8′ 9½″	58″	43¼″	X	X	X		
G.....	57.5	2500	4111	8′ 9½″	58″	42¼″	X		X		
H.....	59.4	2321	3707	8′ 9½″	57″	42¼″		X	X		
J.....	59.4	2321	3395	8′ 9½″	57″	42¼″	X	X			
K.....	62.5	1900	3977	8′ 8″	56″	48⅞″	X		X		
L.....	93.0	3860	5962	10′ 7″	66″	42″		X		X	
M.....	93.2	4045	6079	10′ 7″	66″	42″		X		X	
N.....	93.6	4150	5511	10′ 7″	66″	40″	X			X	
O.....	94.2	4083	5888	10′ 7″	66″	40″				X	
P.....	105.0	4670	7107	13′ 2½″	64¼″	42″	X			X	
Q.....	115.6	4820	6941	12′ 10½″	62⅞″	40½″		X			X
R.....	115.0	4800	6800	12′ 10½″	62⅞″	40½″		X			X
S.....	131.6	5000	7518	13′ 2½″	64⅛″	48″	X			X	
T.....	144.0	5015	7619	12′ 10½″	62⅞″	40½″		X			X
U.....	176.0	4960	10231	13′ 7⅝″	72″	45⅞″		X			X

Table II—Specifications of Cars Used at Mechanical-Loading Mines

Mine	Car-Level, Cubic Feet	Weight of Car	Average Weight of Coal — Hand-Loaded	Average Weight of Coal — Machine-Loaded	(1) Horizontal Displacement, Square Feet	(2) Vertical Displacement, Square Feet	(3) Total Displacement, Cubic Feet	Construction: Wood	Composite	Steel	Ratio, Coal Weight to Car Weight	Pounds of Coal per Cubic Foot Displacement
1.....	59.4	2321	3707	3500	41.76	29.28	139.06	X			1.50	25.2
2a.....	57.5	2000	3515	3400	42.45	30.06	145.21	X			1.70	23.4
2b.....	93.6	4150	5511	5000	58.21	35.23	193.84		X		1.20	26.0
3.....	93.0	3860	5902	5540	58.21	35.23	193.84		X		1.43	28.5
4.....	115.6	4820	6941	6400	67.46	32.45	228.01			X	1.33	28.0
5.....	198.0	5100	....	11000	84.60	46.62	279.72			X	2.16	40.0

(1): Over-all width × over-all bumper-to-bumper length. (2): Over-all height × over-all bumper-to-bumper length (above rail). (3): (1) × over-all height above rail.

equipped with Timken bearings. Cast-steel Timken-bearing wheels are installed on ten cars. The stub-axle design permits using the car on tracks gaging 40 to 44 in. by shortening one end of the axle and using a pad filler. In this car there are no obstructions except wheel hoods, bulb angles, and the spring-bumper hood. After about two months, a check showed about 100 lb. of material sticking to each car.

Couplers are not self-centering, and to the present have been entirely satisfactory. We experienced some difficulty with cars "jack-knifing" off the track when long trips were being pushed. This has been practically eliminated by track improvements and shortening the length of trips. At present, we are pushing up to 45 cars per trip on a straight run. These cars go around No. 2 turnouts, 40-lb. rail, equivalent to a 21-ft. radius curve. To completely eliminate "jack-knifing," we are experimenting with a curved bumper in connection with the coupler. The action is similar to the rounded bumper on the old wooden cars, using the three-link fastening. The resultant of the pushing force then will be transmitted to a point well between the wheels.

Ten of the cars, incidentally, are of welded construction to give us a comparative life and maintenance picture. In the riveted cars there are 312 5/8-in. rivets, 52 3/4-in. rivets, and 16 5/8-in. bolts, the latter retaining the stub axles, plus 502 lineal inches of weld. On the welded cars there are 1,802 lineal inches of weld, 106 5/8-in. rivets, 52 3/4-in. rivets, and the 16 5/8-in. bolts.

Experience indicates a decided improvement in machine output, tons per man, and cost with this larger car. Another of our mines is to be equipped with this same car in the near future. At this mine, one car will carry more coal with a smaller total weight than two of the present cars, a big advantage when hoisting.

OUTPUT JUMPED

By Modern Electric Dragline

And Preparation Revisions at Big Bend No. 1

ONE OF THE latest examples of breathing new life into an old property by the installation of modern equipment is furnished by Big Bend No. 1 strip mine of Big Bend Collieries, Inc., in the Brazil Block field of Indiana. The recent history of this operation includes relocation and modernization of the preparation plant and replacement of old steam stripping equipment with first a 5-cu.yd. diesel-powered walking dragline and next, within a few months, a 10-cu.yd. electric walker. Output consequently has risen to 1,000 to 1,100 tons per day, or 25,000 to 30,000 tons per month, making this property the leading producer in the Brazil Block field.

Big Bend No. 1 was developed from the old Big Bend Coal & Clay Co. property, which was purchased in 1939 by E. E. Munger, now vice president of Big Bend Collieries, Inc., as well as the Goodman Coal Corporation, Chicago, the sales agents. This property later was consolidated with that of the Rockhill Coal & Clay Co., now Big Bend No. 2, with Frampton Rockhill, formerly head of the Rockhill company, taking over the direction of operations as president of Big Bend Collieries, Inc. The changes at Big Bend No. 1 reflect Mr. Rockhill's views as to the equipment and methods required for a stripping operation of its particular type.

In moving the preparation plant to a new and more central location it was rebuilt to ship five sizes with loading on four tracks, using booms for lump and egg. Coal comes to the plant in trucks, which dump into a 50-ton hopper feeding a drag conveyor leading up to the main shaker screen. This screen separates the coal

into lump, egg, nut and screenings, the usual sizes loaded.

Any or all of these sizes up to the complete mine output, however, can be run to a 24 x 48 single-roll McNally-Pittsburg breaker for crushing and loading when desired. A Simplicity vibrating screen also is installed for dedusting screenings at $\frac{3}{8}$ in., the resultant $\frac{3}{8}$-in. carbon going to a storage bin from which it is trucked to a separate loading ramp above the tipple. All sizes may be dustproofed by the Dustlix process, using Dustlix or straight dustproofing oil.

Big Bend No. 1 recovers the Upper Brazil Block vein, averaging 30 in. in thickness. The vein is clean and in the present location lies under an average of 44 ft. of cover. Above the coal is 12 to 23 ft. of shale, followed by 4 ft. of sandstone, then hardpan and surface material.

Stripping originally was handled by an old steam shovel with 7-cu.yd. dipper. Opinion indicated, however, that a dragline would be a more suitable machine for an operation of this character, and consequently a Bucyrus-Monighan 5-W diesel-powered walking dragline with 120-ft. boom and 5-cu.yd. bucket was placed in operation Aug. 1, 1939, supplemented by a 37-B gasoline loader with 2-cu.yd. dipper.

The performance of this unit, under the direction of Mr. Rockhill and Ralph Houk, general superintendent, was so satisfactory as to lead to the conclusion that a larger machine was warranted. Consequently, the 5-W was traded in on a Bucyrus-Monighan 10-W electric walking dragline with 170-ft. boom and 10-cu.yd. "Red Arch" bucket, which went to work Sept. 19, 1940. The unit is powered by Westinghouse electrical equipment and is fitted with American Steel & Wire Co. ropes. Under Big Bend conditions, it has a capacity of approximately 300,000 cu.yd. per month. Experience with the 5-W machine also was responsible for the installation of a 5-cu.yd. diesel-powered Monighan dragline with 120-ft. boom at Big Bend No. 2 in June, 1940.

Replacement of an old steam stripper with first a 5-cu.yd. diesel and next a 10-cu.yd. electric walking dragline were among the measures employed to increase production substantially and breathe new life into what is now Big Bend No. 1 mine. Relocation and modernization of the preparation plant was another step in the improvement campaign which has raised the property's output to 1,000 to 1,100 tons per day from a 30-in. seam under 44 ft. of cover.

To supply the 10-W unit at No. 1, the Northern Indiana Power Co. built nine miles of transmission line to a substation on the property. Service to the pit at nominally 4,000 volts is provided by three pole-line laterals at the present time. In addition to the three conductors, the laterals carry a fourth ground wire. The dragline is equipped with a 1,000-ft. American Steel & Wire Co. cable—basket-weave shielding around each conductor with a fourth ground wire. Drop loops comprise the connections at the ends of the laterals, with cutouts and an oil switch at the transformer station. The ground is made at the station between the cutouts and the machine circuit.

Aside from the dragline and loading shovel, equipment at Big Bend No. 1 includes an Allis-Chalmers gas tractor with Baker bulldozer for rough cleaning, road work, etc.; and a sidewall drill made from a Model A Ford truck chassis and engine, with the differential driving the thread bar. Hauling is done under contract with Floyd Wells, Brazil, Ind., who employs both 9-ton end-dump International trucks and 14-ton tandem-drive machines, the latter only as required. One-way haul from the pit to the preparation plant, largely over hard-surfaced public roads, is 2 to 3 miles.

Usual pit width is around 65 ft., and the practice is to leave a 14-ft. berm for the trucks until the end of the pit is reached, whereupon the berm is loaded out while the dragline is turning and starting a new cut. In this operation, and at other times as conditions dictate, the trucks operate either on the hard clay bottom or the berm, whichever is most convenient.

Drilling depth is 60 ft., the breakback being sufficient to provide the usual 65-ft. pit width. Hole diameter is 4 in., and the usual spacing is 30 ft., with variations as required. The overburden is shot with 3 x 16-in. Atlas Apex D (black powder with a dynamite core). Quantity loaded per hole, depending upon the material and other conditions, varies from 125 to 200 lb.

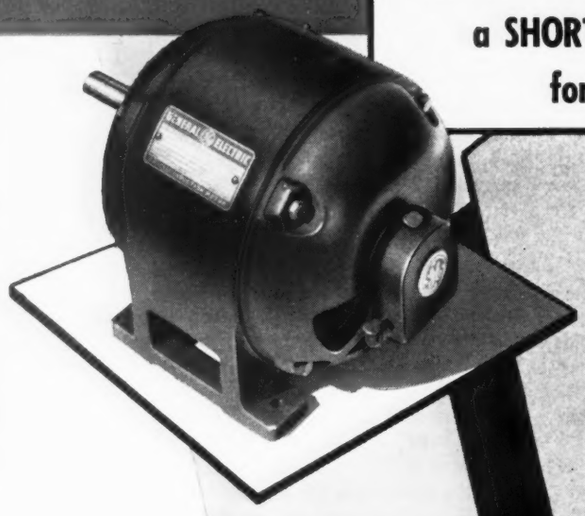
Pit length is over one mile, and it has been laid out so that the dragline can be worked continuously, three shifts a day, over an entire pay period, without any coal being loaded. Thus, in any one pay period it is not necessary to lay the dragline idle while, as provided by contract, the salaries of the operating crews continue.

Left, pit operations at Big Bend No. 1, with the new dragline in the background; right, Big Bend preparation plant.

When We Cut

THE ENDS OFF THE BEARINGS

In the Tri-Clad motor, G.E. uses a SHORTER sleeve bearing for LONGER life



Extra Protection

against operating wear and tear

For years, G-E motor designers have been experimenting with sleeve bearings of all kinds. They have found that a shorter sleeve bearing—one with new diameter-to-length proportions and a more effective type spiral grooving—is a fundamentally better bearing: that such a bearing can successfully withstand the stress imposed by short-center, hinged-base drives and similar applications.

In addition, the new sleeve-bearing housings on Tri-Clad motors are dust- and oil-tight. These and many other features are your assurance of a dependable, free-running motor.

In Tri-Clad ball-bearing motors, the bearing is completely enclosed in cast iron. There are only three major parts in the bearing assembly—the end shield, the inner cap, and the bearing itself. Close-fitting running seals keep out ball bearings' worst enemies—dust, dirt, and water.

You'll find that Tri-Clad motors are usually quiet and smooth-running; you'll find that they stay on the line when the going is tough. They'll give your production *extra protection* during *extra* years of service. Specify them on your next motor order. General Electric, Schenectady, N. Y.

Extra Protection

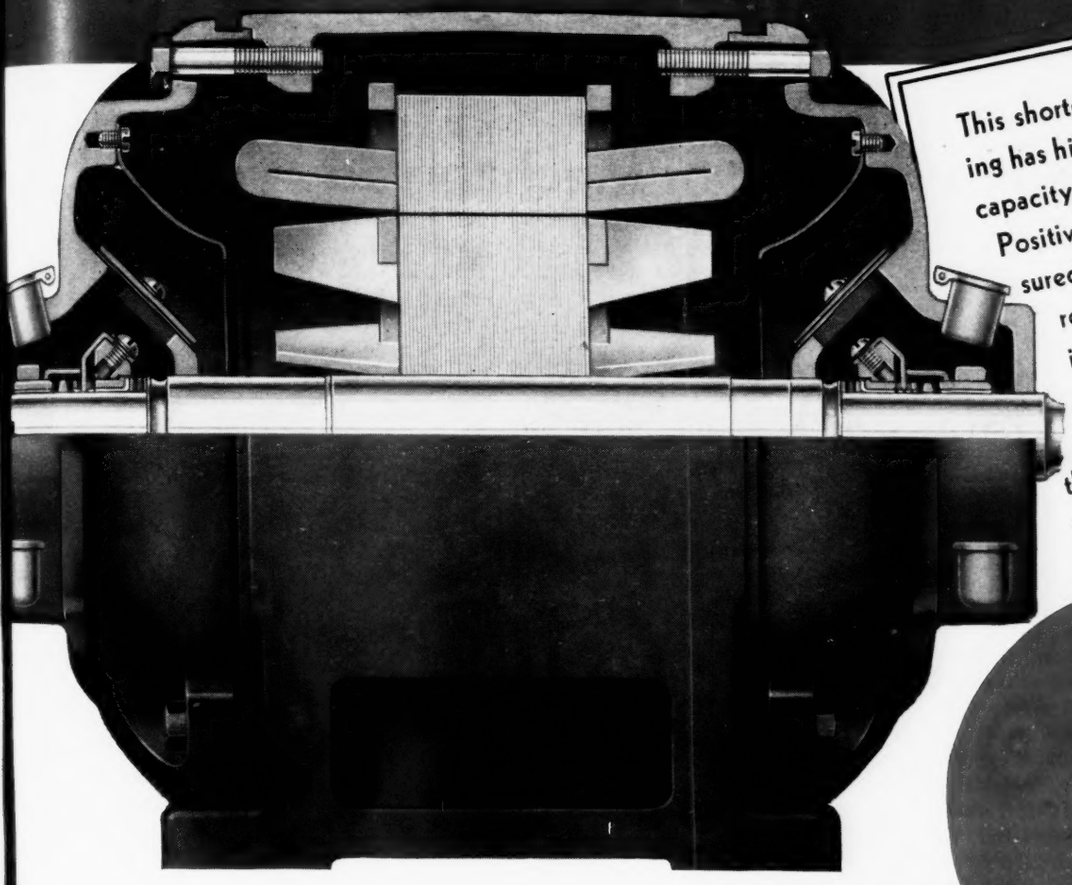
against electrical breakdown

Stator windings of Formex wire give extra protection against moisture, oil, abrasion, and heat shock. A tough, synthetic resin bonds the coils, and a coat of Glyptal 1201 Red on the end windings completes an insulation which maintains its strength during years of strenuous service.

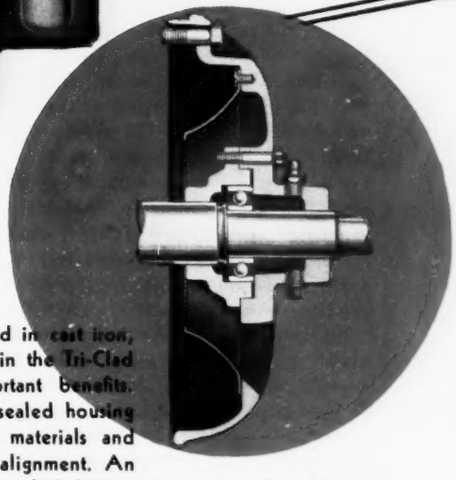
GENERAL ELECTRIC

750-28-8058

We Cut
YOUR MAINTENANCE WORRIES



This shortened sleeve bearing has higher load-carrying capacity and longer life. Positive lubrication is assured by its corrosion-resisting oil ring and improved spiral grooving—the bearing runs full of oil regardless of the direction from which the load is imposed.



Built for protection first...
...to last!

Completely housed in cast iron, the ball bearings in the Tri-Clad motor offer important benefits. The single-joint, sealed housing excludes foreign materials and maintains proper alignment. An improved pressure-relief lubrication system facilitates getting fresh grease where it is needed and helps to expel worn-out grease.

TRI CLAD
INDUCTION MOTOR
GIVES EXTRA PROTECTION 3 WAYS

Extra Protection
against physical damage

The strong, one-piece cast-iron frame and end shields, with upper portion completely enclosed, protect vital motor parts from external blows, flying chips, settling dust, and dripping liquids.

GROUNDING PRACTICES

Must Be Responsive to Changes Introduced by Advent of Mechanized Mining*

By PAUL M. BARLOW
West Virginia Engineering Co.
Charleston, W. Va.

CORRECT practice in grounding electrical and mechanical equipment is constantly changing. As the industry mechanizes, new problems and hazards appear. The best known grounding practices at various operations should be shared and, if possible, codified.

According to latest tests, the maximum safe value of allowable current to pass through a man's body is 8 milliamperes a.c., or 80 milliamperes d.c. The lowest recorded voltage for an electrocution was 15 volts; practically all mine voltages, therefore, are dangerous. Well-grounded exposed surfaces are generally considered safer for personal protection, because static charges, if not excessive, are drained off and potential differences[1] are lessened.

Since the current flow depends upon the difference in potential impressed, this always should be kept as low as possible. Proper grounding —in this case making the resistance (impedance in a.c.) of the ground connection as small as practicable— assures a low potential for most conditions. Where a low-resistance ground cannot be obtained economically, it may be advantageous to isolate or guard the equipment. Grounding will not eliminate all hazard, but merely lessen it.

Equipment frequently is run with leaking insulation to protect property. Grounding the frame under such conditions may cause considerable damage to the equipment. Greater stress is placed on the windings when the frame is grounded. Electrically, therefore, equipment can be run with less probable damage if insulated completely from ground. Requirements are exactly the reverse, however, for personal safety.

Static electricity can be created in several ways. Proper grounding of gunite equipment, compressors, belt conveyors and particularly steel buildings when being painted should always be considered. Proper grounding effectively controls static charges.

Worth-while safety rules drawn from Bureau of Mines Technical Paper 402 and other sources include:

1. Follow the National Electrical Code and National Electrical Safety Code whenever possible.
2. Remove all causes of electrical hazard at the source.
3. Remove all explosives and inflammable materials from the vicinity of electricity.
4. By insulation, keep the electricity in the channels where it belongs.
5. Use a large safety factor in designing and purchasing electrical equipment.
6. Always have full control of the operation of electrically driven machinery.
7. Connect the large mass of earth by proper electrical connection of low resistance and adequate carrying capacity to the object to be grounded.
8. Keep space around permanent electrical installations free for passers-by.
9. Keep standing room dry around electrical equipment.
10. Keep an insulated mat on the platform around equipment operated at 300 volts or over.
11. Ground all castings, frames of stationary machines and portable machines whose frames are not in contact with the earth.
12. Ground metallic sheaths well.

Grounding transmission systems to protect service and equipment may be helpful or harmful. Frequently grounding an a.c. system at more than one point permits heavy fault currents to flow and, where mine rails are paralleled, increases the opportunity for fault current to flow between two points.

In balanced-load systems of relatively low voltages (2,300 to 6,900 volts) and short length, the need for grounding the neutral is not great. The neutral usually is absent in 2,300-volt systems and present in 4,000-volt systems. Partially grounded neutrals (50 ohms or more) are not particularly advisable because of variable standards of maintenance. Results desired can be accomplished in other ways.

While a solidly grounded neutral system offers certain advantages, these are outweighed by the fact that dangerous heavy fault currents may flow. Usually the 4,000-volt Y-system results from a change-over of the 2,300-volt system. If the neutral is grounded, the two-element overcurrent protection must be changed to a three-element one.

If the neutral is isolated at the receiving end for all balanced loads, current-carrying conductors are completely insulated and held within their bounds, and no fault currents can flow through the neutral. If the neutral is grounded at the supply station and an insulation failure develops on a grounded machine frame, some current may flow; but, if a phase-balance relay is used, any serious unbalance caused by current flow will shut down the substation.

* Abstract of an address entitled "A Discussion of Grounding Practices for Coal Mines," delivered before the New River and Winding Gulf Mechanical and Electrical Institute at Beckley, W. Va., June 12, 1941.

[1] "The current between two points in a circuit is due to a different electrical state or 'potential' at each point. For this reason, voltage is sometimes called the difference of potential."—*Standard Handbook of Electrical Engineering.*

Generally when low-resistance ground connections are assured, the use of interconnection to protect distribution transformers is advised. With single-phase transformers for lighting or small power loads, the pellet arresters on the line side of the fuse cutouts protecting the transformer can be grounded at the transformer and interconnected with the secondary neutral, which, in turn, is grounded at the services.

No neutral is available on the high-tension side with 2,300-volt systems, but grounding the neutral wire on the secondary side of the circuit is advised, particularly where underground water-pipe systems are available. Where not available, multiple grounds at many locations tend to afford a good low impedance value to ground.

In general, use of interconnection of primary lightning arrester grounds, primary grounded neutral, if available, grounded secondary neutral supplying the lighting load and other multiple ground connections are considered good practice. Interconnect as many secondary neutrals as possible, since each additional interconnection means lowered impedance to ground.

Lightning Protection

Generally speaking, lightning-proof lines are possible. The "degree of lightning protection is limited only by the money which can be economically spent for" it. Proper grounds for lightning arresters are very important. Line-type arresters, station-type arresters, capacitors and overhead ground wires can be added in any combination. An ample ground connection of low resistance is most important. Mine rails for lightning-arrester grounds have proved excellent electrically, but their complete safety is still debatable. When possible, the National Electrical Code suggests a separate ground from the rails.

Since the average value of mine-rail resistance to ground varies from 1 ohm to about 20 ohms, tests should be made in each case. Mines should have at least one alternate ground connection for each substation where rail resistance is high. Where borehole casings or water lines are available, the problem is simplified; where an artificial ground must be constructed, care must be used.

Larger wires—4/0 is not too big—for grounding and better terminal connections should be used. Brazing to the frame if vibration is present may be desirable to obtain good contact. Inspection of the ground connections at frequent intervals is recommended. Tests should be made every year. Use of d.c. capacitors or suitable arresters across the terminals of machines increases protection. The capacitor also aids where flash-overs are the tendency.

Temporary ground connections for power conductors when men work on the lines should be standard practice. Static electricity can be drained to a good, carefully made, temporary ground. Care should be used in grounding lines so that men do not work in positions where a drop in potential occurs across their bodies.

Avoid metal fences around high-voltage equipment unless there is an exceptionally good ground connection. Before using the steel framework of any building for grounding exposed metal surfaces of electrical equipment, it should be determined whether the steelwork is at ground potential; if not, it should be grounded to prevent shock.

Since in the d.c. mine circuit the negative is grounded with current return in the rail as standard, positive wires should be kept insulated, negative wires grounded, and rails well bonded. Grounding of rails frequently is not perfect, since they rest on rocky soil and mine ties. As an added safety precaution, a supplementary ground connection, such as a water system, borehole casing or artificial ground, is desirable if the mine rail is to be counted on as an absolute grounding medium.

Less Eectrolysis Trouble

Electrolysis is a less serious problem since rail bonding has been improved and metal-armored power cable has been supplanted by the rubber or chemically inert jacket. Where pipe lines or armored cables parallel the rails, effects of electrolysis may be lessened by bonding the pipe or armor to the rail in several places. With light track-carrying capacity, there is danger the armor of pipe may carry heavy currents if a bond is broken and current densities are heavy.

Utility investigations show the two outstanding causes of shock and electrocution are dampness and cramped quarters. Since mines have these and other undesirable features, grounding equipment frames should be standard practice. As the mine rail is the only reliable source of grounding inside the mine, the bonded rail should be utilized.

In grounding frames of d.c. machines, a current-carrying conductor should not be used as a ground wire but a conductor should be carried from the machine frame back to the mine rail.[2] This should be done for drills, conveyor motors, blowers, etc., whether a.c. or d.c. The new "D" type cable with protected ground wire should be ideal for d.c. equipment and the fourth wire could be built in three-phase a.c. cables. Splicing may present difficulties, but, if spare units are kept available for replacing damaged cable in the mine, splicing could be done properly in a shop where cable lengths also could be tested for insulation and general condition.

Grounding in Substation

For personal safety, frames of substation rotating equipment should be grounded. If an a.c. capacitor is used for lightning protection, the frame should be well grounded; not less than 5 ohms resistance to ground is recommended. Interconnection of all metallic parts and the ground connection should be carried out if there is any probability that they may acquire an electrical potential difference from earth or neighboring metallic parts. In most cases the secondaries of potential and current transformers also should be grounded. Such grounds usually should be restricted to a single point on each circuit to avoid sneak currents which may affect meter or relay accuracy.

Grounding may be inadvisable: (a) When the equipment is isolated and adequate grounds are not readily obtainable; (b) when work is to be done on brushes or other live parts of machines during operation and insulating mats are provided; and (c) when bare conductors operating at more than 150 volts are mounted on switchboards.

In order of decreasing time duration and increasing magnitude of voltages and currents, the non-current-carrying parts may acquire potentials different from earth by: "(a) Contact with some energized conductor; (b) induction from the normal currents and potentials of the system; (c) insulation leakage; (d) induction from neighboring conductors exposed to lightning; (e) impedance drop from lightning discharge or fault currents in the earth or grounding connection; (f) flash-over; and (g) direct light-

[2] U. S. Bureau of Mines *Schedule 2-D for Permissible Equipment.*

(Turn to page 94)

WITH ONE LOADER

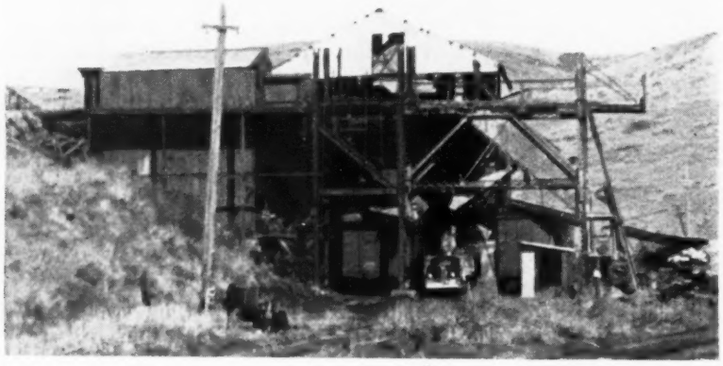
Served by Single Shuttle Car

Brophy Mine Averages 15 Tons Per Man Below

Working 6-ft. 4-in. coal on an 8-per cent pitch, one loading machine served by a single cable-reel shuttle car enables 14 men underground to average 210 tons per seven-hour shift at Brophy mine, served by a steel tipple with facilities for shipping six different sizes. The shortwall cutter, using patent bits, is transported on a mine-made rubber-tired truck. Mine cars are loaded by a double shaker chute.

SUCCESSFUL mechanization of a small tonnage has been achieved at the Brophy mine of the Brophy Coal Co., Red Lodge, Mont., formerly the Clean Fuel Co., by installation of a loading machine and cable-reel shuttle car, supplemented by a shaker-type mine-car-loading conveyor. With this and other auxiliary equipment, including a shortwall cutter transported on a mine-made rubber-tired truck, 14 men underground were averaging 210 tons per seven-hour shift in 6-ft. 4-in. coal pitching 8 per cent S. 37 deg. W.

The Brophy Coal Co. is owned and managed by James R. Brophy, son of James F. Brophy, who, in addition to wide experience in engineering and mine operation throughout the country, was one of the pioneer operators in the Red Lodge-Bear Creek field. His Smokeless & Sootless Coal Co. opened what is now the Brophy mine in 1906 and still owns the coal. The younger Mr. Brophy took over from previous lessees in 1940 and immediately installed the shuttle car and loading equipment, along with Edison electric cap lamps, M-S-A safety headgear, safety shoes and American Optical Co. spectacle-type goggles for men customarily engaged in picking or other work where material might fly. Cardox coal-breaking equipment for raising lump percentage and improving quality is another recent addition. Aside from Mr. Brophy, the mine staff includes Walter Sandine, foreman; J. T. Newell, master mechanic; Joe Haggerty and Art Maddox, electricians; and Joe Enrico, mine clerk.

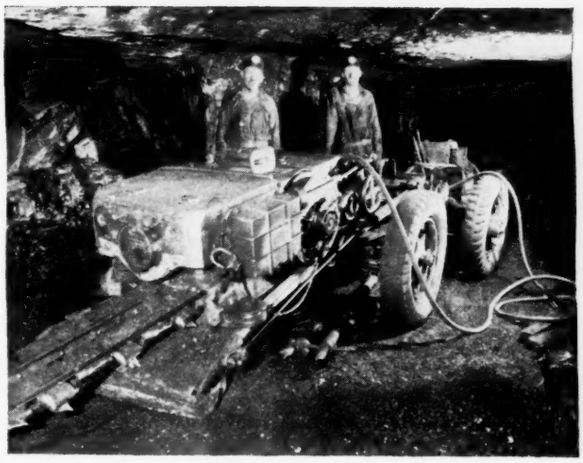


The Brophy preparation plant is equipped to prepare lump, two sizes of egg, nut, stoker and screenings.

Operations are in the No. 2 seam, averaging, as stated, 6 ft. 4 in. in thickness and pitching 8 per cent. The seam is clean, except for a thin bony band near the top, which at present is removed by hand picking. A dip entry 4,000 ft. long provides access to the workings. Over the coal is 4 ft. of dark slate. Some 4 to 6 in. is inclined to loosen after standing for a time. Consequently, after the coal is loaded, it is taken down and gobbed. The remainder, which makes a fairly good roof, is overlain by 60 ft. of sandstone. Additional protection is provided by setting timber, one man being specifically assigned to this task, with more as needed.

Underneath the seam is about 2 ft. of fireclay, of which the top 4 in. is very hard. Since this would make a very good floor for loading, consideration is being given to top cutting with a hydraulically controlled universal machine on caterpillars, which would obviate the shock to the top resulting from shooting and also eliminate automatically the thin bony band previously referred to.

The No. 2 seam at Brophy mine yields a good domestic coal, which investigators have pronounced "smokeless and sootless" in view of the fact that its composition is such that no heavy black volatiles are produced and consequently soot formation is reduced to a minimum, also increasing the heating efficiency. A government analysis shows a moisture content of 9.1 per cent on the "as-received" basis. On the dry basis, ash is 5.7 per cent; sulphur, 1.53 per cent; B.t.u., 12,440. The fusion temperature



Cutting machine, using patent bits, being unloaded from the mine-made rubber-tired truck.

Drilling a hole in a room face. In the foreground is the drill cart with rubber tires.

of the ash apparently is such as to facilitate the formation of a "doughnut clinker" in stokers.

The coal is prepared in a steel tipple with screening equipment for lump, two sizes of egg, nut, stoker and screenings. Box-car loaders are provided for lump, egg and nut shipments in railroad cars, with the necessary chutes and degradation screens for loading trucks. Storage bins for stoker and nut are used for either rail or truck loading. Additional screening equipment is to be installed to further improve stoker preparation, as well as a crusher and recirculating facilities for increasing the stoker supply when necessary by breaking down and rescreening nut coal.

Development at Brophy mine is based on turning three-heading cross, or block, entries off the dip entry, and driving them diagonally across the pitch to the boundary or other limit. Heading width is 12 ft.; centers, 50 ft. A sidetrack is built in the mouth of a block entry for use in changing trips, which are handled on the dip entry by a surface hoist. On the block entry, trips are moved by a small MH-96 trolley locomotive, which also spots cars for loading.

Rooms are turned both ways off the block entry, those on the lower side being angled to provide a grade of 1½ per cent in favor of the loaded shuttle car. These rooms, however, are used primarily as reserve working places and consequently their depth, under the present working plan, is not great. They will be picked up from the next lower entry when it is brought into production. Rooms on the upper side are driven straight up the 8 per cent pitch. Normal depth is 250 to 300 ft., as the plan is to keep the maximum one-way shuttle-car haul within 350 ft. Room centers are 50 ft.; usual width is 16 to 20 ft. With headings and reserve rooms, the number of working places normally available is 10 to 15.

Present practice is to drive the rooms up as the entry advances. When the entry reaches its limit, the room pillars, 20 to 24 ft. thick and 25 to 30 ft. long, will be mined by driving through them from one side, leaving fenders about 3 ft. thick on the ends to crush down or be shot out. The 45-deg. line also will take in the entry chain pillars.

Production equipment, aside from 1½-ton mine cars, locomotive, etc., consists of a Joy 8-BU loading machine, 5-ton Joy cable-reel shuttle car, Jeffrey 50-hp. 35-BB shortwall with 6-ft. bar (Bowdil 7-position chain and bits), Dooley post-mounted coal drill (Coalmaster conveyor-type augers, heads and bits), and shaker-type car-loading conveyor. The operating force is made up as follows:

Mine foreman	1
Faceman—timbers, gobs slate, cleans up and does other work as required	1

The cable-reel shuttle car is here shown working up the full 8-per cent pitch in Brophy mine.

Mine cars are loaded by this shaker-type conveyor, which receives coal from the shuttle car.

Timberman—works with faceman and also handles the necessary tracklaying; does other work as time permits	1
Loading-machine operator and helper	2
Shuttle-car operator	1
Cutters	2
Shotfirers—drill, bugdust cuts, load holes and shoot after working shift	2
Motorman	1
Nipper—also operates conveyor and oversees loading of mine cars	1
Electrician	1
Roperider—main dip entry	1
Total underground	14

Average output per 7-hour shift 210 tons

Shotfirers are supplied with a rubber-tired cart with light steel body and tongue for moving the drilling equipment. The rubber-tired cutting-machine truck was made from the running gear of a 1931 Dodge 1½-ton truck fitted with steel step and vertical steering post. One end of the frame supporting the cutting machine is attached to the steering axle by a kingbolt, thus providing 3-point suspension. The truck is powered by an 18-hp. motor and controls off an old 27B breast machine. The original truck differential was turned over and the transmission attached directly to it by a flexible coupling.

Connection between motor and transmission is by pinion and gear providing a ratio of about 4:1. The regular gearshift is available for use as desired, in addition to a lever brake acting on the transmission. As the steering wheel is located alongside the transmission, what was the back end of the unit now is the front, with the transmission, motor and controls overhanging the original rear axle and balanced by the cutter bar over what was the front axle.

Although 1¾-in. pellet powder was in use when this article was prepared, plans were being made for the installation of Cardox. Rooms 16 to 20 ft. wide were being shot with three holes loaded with pellet. Two top holes (Fig. 1) were drilled on a natural division line about 1 ft. 4 in. down from the top, this to reduce shock to the roof. A third hole, drilled from one of the two set-ups, is angled down to another division line about 2 ft. above the bottom of the cut. Top rib holes were loaded with 3 to 3¼ sticks of pellet, with 2½ sticks in the bottom. Holes are stemmed with clay dummies. Preliminary tests indicate that three holes also will serve with Cardox breaking, which is expected to raise standard lump yield substantially above the present figure of 65 per cent over a 2-in. screen, improve the quality of the lump, and make loading easier.

The 5-ton shuttle car is powered with four motors rated at 4 hp. each, one for the conveyor, two for the drive wheels and one for the reel, which has a capacity of nearly 1,000 ft. of No. 8 concentric cable, although only 500 ft. is installed. One end of the cable naturally is anchored at the transfer station, allowing the shuttle car to go 500 ft. in any desired direction. The cable-type car was chosen because power could be taken off the regular d.c. circuit and thus would not be subject to diminution as the shift wore along. Also, the extra demands resulting from maneuvering the car at the loading machine, frequently requiring backing up the full pitch with nearly a full load, would have no effect on the unit's ability to complete a full shift. All the expected advantages of the cable power supply have been realized in operation.

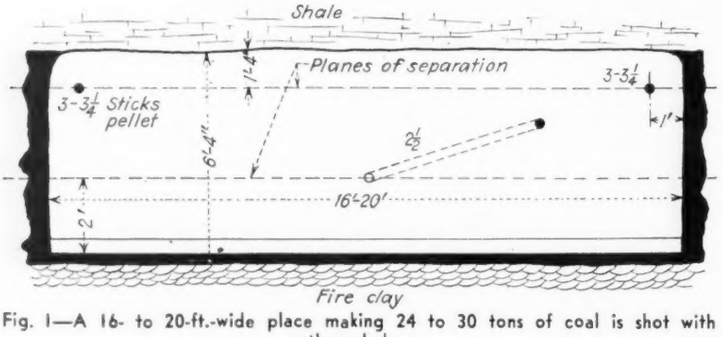


Fig. 1—A 16- to 20-ft.-wide place making 24 to 30 tons of coal is shot with three holes.

Loading machine at work in a fresh fall of coal.

Old Shaker Conveyor Used

The mine-car-loading, or transfer, unit at Brophy mine was made from an old 15-hp. Link-Belt shaker conveyor. To provide the required capacity, the pan line was doubled up, as shown in an accompanying illustration, and fastened together by welding. High sideboards on the back end also were found helpful in providing the necessary capacity. With a length of 48 ft., the conveyor will hold 1½ shuttle-car-loads of coal. Average time for unloading a shuttle car onto the conveyor (5 tons of coal) is 40 seconds, after which the car returns to the face, leaving the coal to be shaken down and loaded into the 1½-ton mine cars. A second conveyor unit is contemplated, so that one can be set up and ready in a new section when the time comes to move from the old.

TRUCKING FACILITIES

Added to Iowa Railroad Mine Increase Sales 20.1 Per Cent in 7 Years

HOW a railroad mine has increased production by installation of truck loading facilities is reflected by Shuler Coal Co. at its Waukee No. 1 mine, 14 miles west of Des Moines, Iowa. Truck sales, since installation of the bins seven years ago, have amounted to 306,004 tons, or 20.1 per cent of total mine output. The total mine production has increased from 164,813 tons in 1933 to 249,913 tons in 1939.

Along with the depression came a large drop in sales, so that when a concrete highway was built a mile from the mine, the company, alert to possibilities of new markets, investigated trucking. A survey substantiated the availability of truck business, and in 1933 the necessary facilities were installed at a cost of $40,000. Small tonnages always had been sold locally to miners and farmers, but after this plant addition truck trade increased from 9,058 tons in 1932 to 40,738 tons in 1939 with a high of 60,823 tons in 1936. Coal is trucked up to 200 miles distant. However, most sales go into domestic and office heating, which are seasonal and dependent upon severity of the winter.

Truck orders differ from rail shipments in that immediate delivery often is demanded, requiring a constant supply of sizes. The coal must be of good quality to compete with railroad shipments. Truckers' convenience for loading and weighing assures efficiency and promotes return trips. Orders may be taken by the company but all hauling is by independent truckers.

The original three-track preparation plant was left intact and trucking additions were planned with cooperation of Link-Belt engineers. They include a 225-ft. 36-in. flight conveyor which travels over four truck bins and is filled by the railroad loading booms. By means of an electrically operated sliding bottom its load is placed either in a 100-ton bin divided to hold fine and large steam sizes, a 220-ton lump, a 75-ton range or a 75-ton nut bin. The sliding bottom of the conveyor not only permits a quick change to any needed size but also gives controlled loading: i.e., by keeping the end of it just off the edge of the cone of coal there is little drop and consequently minimum breakage.

Drop-chute loading booms serve the trucks and each, except for the steam sizes, has a 2-in.-hole degradation screen. The lump and range booms are equipped with chain conveyors. They all have pushbutton control and are designed to load with minimum coal breakage. The degradation, by an 18-in. belt conveyor, loads a bucket elevator that discharges into the industrial stoker bin.

Separated from the main bins is another range-coal bin of 25 tons capacity which is fed by a conveyor from the plant. A 6-ft. 2-in. hole shaker screen removes degradation at the conveyor-equipped loading boom. Two 75-ton steel bins also were built to store fine or large steam sizes in one and nut in the other and feed railroad cars or the 36-in. truck-bin conveyor.

The mine offers 6-in. fancy chunks (lump), 8x2-, 7x2- or 6x2-in. range (egg), 2x1¼-in. nut, 2x0-in. large steam, 1¾x0-in. fine steam, 1¼x0-in. industrial stoker, and mine-run. All of these sizes, except nut, were made before trucking began and all can be railroad and truck loaded. Total truck sales average 44.1 per cent steam, 27.7 per cent range, and the balance is lump and nut. A Fairbanks double-dial 25-ton graduated scale at the mine office does the weighing. The double-dialed scale permits the trucker to check his own load and increases efficiency, as shown by weighing 1,000 tons in a single day.

Truck loading facilities, on the right, have been added to the original three-track preparation plant.

FOREMEN'S QUESTION FORUM

Blackdamp Is Changing as Time Progresses; Less Often Today Is It Rich in CO_2*

With new mining methods, blackdamp is getting lighter, high nitrogen content being more evident than presence of carbon dioxide. Blackdamp, is so variously defined that it is difficult to know what is meant by the word. Less carbon dioxide is being formed today than a few years back.

ACCORDING to some authorities, "blackdamp" is any extinctive atmosphere, meaning any atmosphere that will put out a light or snuff out a life, but even they, if pressed, must admit that it must be extinctive due either to the loss of oxygen or the presence of carbon dioxide or a combination of the two, for, otherwise, some highly explosive gases would be included as "blackdamps." Pure methane and pure acetylene are, in a sense, extinctive gases for "as, if and when" insufficient oxygen to burn them is present, they refuse to burn, but no one would class them as blackdamp. Added in quantity to mine air, they may even render the atmosphere inexplosive or less explosive. Blackdamp usually is required also by definition to be a mine or cave gas.

However, the U. S. Bureau of Mines, in Report of Investigations 3327, exhibits by its use of the word that it gives "blackdamp," at least occasionally, a different definition regarding it as a natural mixture of all the nitrogen and carbon dioxide in a mine atmosphere. If the appellation were applied to air at the surface of the ground, that atmosphere would contain 79.6 per cent by volume of blackdamp; that is, 79.03 of nitrogen and 0.03 of carbon dioxide.

This is carrying the use of the word "blackdamp" well beyond its original sense. It would seem that the term "blackdamp," if it is to be applied to only a portion of the mine air, should not include all the inert gas in air but only that portion of the inert gas which exceeds the quantity in surface air. In Bulletin 105 of the Bureau of Mines, blackdamp was treated as the difference between the total percentage of nitrogen and carbon dioxide in the whole mine atmosphere and the total percentage of the same gases in the surface atmosphere. On the other hand, Information Circular 6983 of the Bureau of Mines declared that "blackdamp" is a mixture of carbon dioxide and nitrogen with relatively little oxygen. "Popularly," it adds, "the term 'blackdamp' is sometimes applied to gases found after mine fires or explosions which contain small percentages of carbon monoxide. Use of the term is disappearing."

But these, though many, are not all the many definitions of blackdamp. Many still declare that blackdamp and carbon dioxide are two names for the same gas, and indeed under some conditions blackdamp may be almost pure carbon dioxide, when the mineral or measures emit that gas in large quantities—in such quantities as to drive out the air of the mine. On the other hand, blackdamp may be merely a mixture of carbon dioxide with air, but rarely indeed is blackdamp of this character, perhaps nowhere in the United States or Great Britain.

The Grotto del Cane, in Italy, and the coal mine at Agrappé, Mons, Belgium, are, from reports, examples in which immense quantities of carbon dioxide seem to be emitted from the strata, and there blackdamp would be largely carbon dioxide with—or possibly without—air. Perhaps, however, sub-bituminous coal and lignite will create atmospheres relatively high in carbon dioxide. Evidence does not seem available, but such heavy blackdamp was unusually prevalent at one time in mines producing coal of that type. Better ventilation has improved conditions, but, so long as the old ventilation inefficiencies continued, the blackdamp seemed to contain an abnormal quantity of dioxide.

Often the extinctive quality that gives "blackdamp" the right to the name is due less to the presence of carbon dioxide than to the removal of oxygen by the oxidation of such a mineral as coal or pyrite. This action makes an excess of nitrogen. Metal mines frequently have blackdamp of this type, for the mineral takes up the oxygen and has no carbon to form a dioxide. In the case of coal, the mineral will absorb some of the carbon dioxide (that is, will take it into its interstices), will adsorb some of it (that is, will pile it up on the exterior as a gas film) and possibly will link some of it chemically with the constituents of the coal, so that the atmosphere will lose more oxygen that will appear as a constituent of the free carbon dioxide thus formed. There is, of course, a possibility that some of the oxygen also combines directly with coal and does not form carbon dioxide in so doing. In the case of pyrite, which is a metal sulphide, the loss of oxygen, of course, is absolute. When oxygen with pyrite forms ferrous sulphate, no carbon dioxide is created.

It is easy to see, therefore, that though carbon dioxide is heavy (specific gravity 1.5282), the resulting atmosphere may have so little of the gas and may so increase in nitrogen (which is lighter than oxygen in the ratio of 14 to 16) that it will be lighter than surface air at the same temperature and pressure. These actions that deprive the air of oxygen take place near the mineral that can absorb or adsorb the dioxide formed or can perhaps link that gas to its own chemical structure. Thus, removal of the latter gas is facilitated, and it may also flow down the face of the coal and be carried away near the floor and not enter into the samples taken for analysis.

Carbon dioxide is formed also by the breathing of men or of animals, the burning of coal, explosives, methane, oil, wax, and acetylene or the rotting of timber and excreta, but these chemical actions occur somewhat remote from the coal surface. In consequence, carbon dioxide thus formed may or may not be gathered up by the coal. According to one authority, the percentage of nitrogen is very little changed by the lungs after the relative content has been corrected for moisture, but the quantity of oxygen by weight is reduced from 23.02 to 15.35 and the quantity of carbon dioxide is increased from 0.03 to 8.62 per cent. Thus the oxygen in the air has been reduced 7.67 per cent and the oxygen as part of carbon dioxide has been increased $(8.62\text{-}0.03) \times 32 \div 44 = 6.25$ per

Table I—Oxygen and Carbon Dioxide in Air Exposed to Shavings and Sawings

	Ash Sawdust		Cypress Shavings		Hemlock Sawdust		Oak Sawdust	
	CO_2	O_2	CO_2	O_2	CO_2	O_2	CO_2	O_2
On charging	0.00	20.8	0.00	20.9	0.20	20.8	0.2	20.7
18 days from charging..	0.15	20.8	0.15	20.80	0.20	20.80	0.2	20.8
34 days from charging..	3.38	17.50	1.98	18.75	7.87	12.0	8.27	15.05
55 days from charging..	11.6	8.6	4.0	16.7	16.6	2.0	17.0	3.1
81 days from charging..	18.9	1.7	6.0	14.4	18.0	0.7	19.2	1.2
168 days from charging.	20.6	0.0	10.0	10.1	17.7	0.3	20.2	0.4

Water was added to each bottle 15 days after the tests were started and just prior to these analyses.

Table II—Carbon Dioxide and Nitrogen in Gases From Detonation of Explosives

(Calculated From U. S. Bureau of Mines, R. I. 2975 Table 5 p. 14)

	Carbon Dioxide Per Cent	Nitrogen Per Cent
Black blasting powder.....	49.74	28.40
60-per-cent ammonium nitrate dynamite.....	30.52	41.66
50-per-cent ammonium nitrate dynamite.....	30.02	42.33
40-per-cent ammonium nitrate dynamite.....	31.90	44.56
30-per-cent ammonium nitrate dynamite.....	36.17	46.47
20-per-cent ammonium nitrate dynamite.....	39.94	41.51

* First of two articles on blackdamp and why the mines have so much of it. Next article will suggest ways of still further reducing the blackdamp content of mines.

cent. Like coal, the human body removes oxygen from the air and returns only a part of it as carbon dioxide.

Wood on its first introduction to the mines is not active in removing oxygen and forming carbon dioxide. But later bacterial action makes the evolution of carbon dioxide rapid and in a tightly closed space causes the oxygen content to drop to zero. The U. S. Bureau of Mines took quantities of fresh wood shavings and the wool obtained from sawing wood and put them in bottles from which samples were withdrawn at intervals, with the results shown in Table I (Bulletin 105, "Blackdamp in Mines").

From this, it is easy to see where the heavy blackdamps are derived and why the early blackdamps were so heavy and contained so much carbon dioxide, for in those days workings advanced slowly and no timber was recovered. The atmosphere developed by the sawdust from the wood of the ash tree, after 168 days from charging, had no oxygen, but 20.6 per cent by volume of carbon dioxide and 79.4 of nitrogen. It had almost as much of carbon dioxide as surface air has of oxygen. Its specific gravity would be 1.08292 if properly mixed or diffused, but the specific gravity of some of the mixture might be much higher, because much of the carbon dioxide may stay near the floor and much of the nitrogen float above it, as frequently happens.

Gases from the explosion of black blasting powder gave an average gas analysis of 49.74 per cent carbon dioxide and 28.40 per cent nitrogen when properly exploded, but less carbon dioxide and more smoke when partially burned. It was a far cry from that to 60 per cent strength ammonium nitrate dynamite explosives with 30.52 per cent carbon dioxide and 41.66 per cent nitrogen, which made a somewhat lighter blackdamp. However, the demand for bulkier and milder explosives—20 per cent strength—caused the incorporation of balsa-wood charcoal and raised the figure for carbon dioxide to 39.94 and left the nitrogen percentage about where it was: 41.51 (Table II).

Formerly Used More Explosive

However, in the earlier days coal often was shot off the solid or the near solid, and the quantity of powder used was considerable. Coal and rock always were shot during working hours and this accounted for a large part of the carbon-dioxide content of blackdamp during operation. Today, coal is cut by machines horizontally and sometimes also vertically to the full depth of the shots, is shot accordingly more gently, frequently shot with permissibles, and shot when men are out of the mines. If only 1½ lb. of permissibles is shot at a time, which is the charge limit of the U. S. Bureau of Mines, the carbon dioxide formed usually will occupy not more than 4 or 5 cu.ft., but usually more shots than one are fired at a time, so that the contamination is greater, but there is plenty of evidence that shotfiring no longer produces as much carbon dioxide as it did.

As 0.362 lb. of black blasting powder was used in bituminous mines in 1917 (Technical Paper 627, U. S. Bureau of Mines, p. 24) per ton of coal mined, the quantity of carbon dioxide produced by that explosive was 1,647 cu.in. per ton of coal. Assuming that in the reference to 1917 40-per-cent ammonium nitrate dynamite is representative of "permissible explosives," as 0.046 lb. of that explosive was used per ton of coal mined, the quantity of carbon dioxide produced by such explosive was 149 cu.in. per ton of coal. "High explosives" would add, assuming them to be 60-per cent straight dynamite, 90 cu.in. per ton, or 1,886 cu.in. per ton for all explosives.

Taking 20-per-cent ammonium nitrate dynamite as the permissible explosive favored in 1939, the figure for black blasting powder, permissible powder, and high explosives would be 542, 312 and 115, respectively, or a total of 969 cu.in. per ton for all explosives, a drop of 49 per cent in the quantity of carbon dioxide. Anthracite explosives also have changed in character, use of black blasting powder declining from 0.359 to 0.098, permissibles increasing from 0.073 to 0.276, and high explosives also increasing from 0.161 to 0.254 lb. per ton of coal mined, so production of carbon dioxide in the anthracite region must have decreased as much as in the bituminous regions and perhaps even more.

In the mine lamp, the hydrogen of oil, naphtha, paraffin wax or acetylene is burned to water and the carbon to carbon dioxide. Acetylene forms more carbon dioxide per pound than the other illuminants and less water because it contains more carbon and less hydrogen. But the true comparison is not by units of weight of illuminants but by light units, and here acetylene doubtless would prove superior to oils and waxes with their lower combustion temperatures and their lesser illuminative capacity. Electric lamps make neither carbon dioxide nor water. The change in the method of lighting has affected the quantity of carbon dioxide in mine air in a small degree, though in earlier days, with poor ventilation, the little carbon dioxide produced contaminated the air in greater measure because the air was less frequently changed. Where flame lamps are used, some of the methane in the mine is burned to carbon dioxide even where the methane concentration is not enough even to make a blue cap on the flame of a lamp. With the poorer ventilation of earlier years, this factor was more in evidence than today. The methane, in a sense, by burning to carbon dioxide, gave a degree of immunity from explosion.

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Beware All Electrical Currents For Almost None Are Safe

Amperage such as used by a 15-watt 115-volt electric lamp may more than suffice to kill a man when supplied from the standard 60-cycle circuit for alternating current, as may be gleaned from an article by C. F. Dalziel and J. B. Lagen, recording the results of tests (*Electrical Engineering*, February issue, published by the American Institute of Electrical Engineers, Main Section, p. 63). Because time of exposure is an important factor, the author's reason that any current of a magnitude that will cause a muscular reaction sufficient to prevent the person from loosing his hold of the conductors is dangerous. Muscular reactions always are proportional to current and not to voltage. A shock might fail to kill, but the continuous flow of electricity which follows the convulsive clutching of the muscles around a conductor would be quite likely to result in death.

Tests on 114 men passing electricity from one hand to the other with 60-cycle current showed that, as an average, they could release their hold of the conductors if the current did not exceed 15.5 milliamperes (0.0155 amp.). Some could withdraw contact when as much as 21.6 milliamperes (0.0216 amp.) was passed through the conductors, but others could not relinquish their hold if the current exceeded 9.7 milliamperes. From this it is reasoned that the 60-cycle current that a man can safely pass from hand to hand has an intensity of only 8 to 9 milliamperes.

Tenth of an Ampere Kills

The authors say that the smallest current that will produce in a human being ventricular fibrillation (a tremor of the heart muscles or a non-rhythmic beat of the heart, which usually proves fatal) has been estimated at about 100 milliamperes (0.1 amp.), and this current must continue for three seconds or longer. A 115-volt lamp of only 15-watt rating takes more current than that; in fact 0.13 amp.

The human body can withstand at least 80 milliamperes (0.08 amp.) of *direct* current, the authors say. Heat rather than muscular contraction is the sensation when direct current is gradually increased after contact is established. Sudden changes of the current or the breaking of the circuit produced muscular contraction. Because men can release their hold on conductors carrying currents of higher amperage, if the current is direct, than they can if the current alternates, the only tests that could be made were to determine the greatest current that a man could endure and still have the "nerve" to let go and take the shock of breaking contact. On 28 men, the limits with direct current were: average, 74 milliamperes; minimum, 61 milliamperes, and maximum, 83 milliamperes.

Most sensitive of all organs likely to touch a live conductor is the tongue, and tests of contacts with that organ necessarily had to be limited to a determination of the minimum current perceptible, which is merely, after all, a matter of interest. The minimums, d.c., for 115 men were: average, 44 microamperes (0.000,044 amp.); minimum, 0.06 microampere; and maximum, 783 microamperes.

Only relatively large currents—amperes, not milliamperes—according to the authors, destroy tissue and thus cause serious injury or death. With such current, death may be sudden or may come after weeks or months as a result of burns of nerves, muscles, bones or vital organs.

No meeting has more material for the mine foreman than that held every year by the Mine Inspectors' Institute of America (see p. 76). It gives the answers to many questions that foremen are having to answer already or will have to answer in a short while—namely, how to make mechanical operation safe. An article on grounding on p. 54 also is of interest to foremen and electricians, who for safety should examine each mechanical installation in the light of advice given in this article.

QUESTIONS ASKED BY STATE BOARDS

Questions, Mine Foremen's Examination Pennsylvania, April 8, 1941

Q.—If given charge of a non-gassy mine, which employs about 300 persons, state briefly what observations, on your arrival at the mine to perform the duties of mine foreman, would you make to ascertain whether compliance is being, or has been, made with the mining law, and whether the mine is being operated safely in the following operating phases: (a) surface operations, (b) underground ventilating system, (c) shelter holes and clearance, (d) safety requirements on electrically operated haulage roads, (e) safety requirements on rope-haulage roads, (f) installation of electrical conductors, including telephone and signal wires; (g) crosscuts, stoppings and overcasts; (h) pumps, inside generator rooms or substations; (i) timbering of working places, (j) blasting of coal and rock?

New Foreman's First Job

A.—(a) In the surface examination the speed of the fan should be checked with the mine foreman's posted notice as to the number of revolutions at which it should be kept running. Observe water-gage reading, also note the audible and visible signals provided to show the speed of the fan and also the audible alarm that sounds as warning when it is accidentally stopped. See that stretchers, blankets and first-aid material are on hand in the first-aid room.

If it is a shaft mine, observe whether the gate at the landing is operated by the cage, and that the top man is on duty; also observe the safety catches on the cage, the bridle chains and the signal appliance at the top of the shaft, the overwinding device on the hoisting equipment, the manner in which the engineer handles his engines, his signal devices, whether there is 4 in. of clearance when all the rope has been wound on drum, and also condition of rope.

If the mine opening is a slope, see that safety switches or other arrangements are provided that will prevent cars from running back down the slope in case they became detached from the trip, also see that signal devices are provided and that the top man is at his place at the top of the slope. Examine the mine map, observe the system of ventilation and general layout of mine workings. Examine the mine record books, and see whether the necessary supply of timber and material for the safe working of the mine are on hand. (2 per cent.)

(b) In the mine, observe direction of air currents, number of splits, number of persons employed in each split, whether the air current is locked at the productive entries to prevent short-circuiting of the air; see whether the air is directed to the active working places, whether overcasts and stoppings between intake and return airways are constructed of incombustible material, whether the doors are hung so that when opened they will close themselves. (1 per cent.)

(c) Observe whether the distance between shelter holes on mechanical haulage roads is nowhere over 45 ft. apart, and on animal haulage roads not over 90 ft. apart and whether all of them are kept whitewashed. Shelter holes made since 1937 must not be over 4 ft. wide and must be at least 4 ft. deep. They must be located also at all doors. Observe whether a clear space of not less than 2½ ft. is left between car and rib on the same side of the heading throughout its length, and whether this space is kept free of all obstructions. (½ per cent.)

(d) Note whether the trolley wire is guarded at all places where men are required to work regularly, and at all landings and partings where men are required to pass under the trolley or other bare wires. The trolley wire should be placed as far to one side of the passageway as possible, but not less than 6 in outside of line of rail. Note whether the locomotives are equipped with headlights which are kept lighted while the locomotive is in motion; whether the motorman allows any person, except his assistant, to ride on his locomotive; whether the locomotive is equipped with a bell or whistle, and carries rerailing devices and whether electric lights are installed at all switches. (½ per cent.)

Watch Rope-Haulage Roads

(e) On rope-haulage roads, note whether shelter holes are located at the required distances and whether the roadbed as well as the rail are ample for the work they have to perform. On slopes, ascertain whether a top man and a bottom man have charge of the trips to see that they are properly coupled before starting. Note where there are any defects in rope or links, and whether drags are attached to the rear car of all trips that have to be hoisted up inclines. Where men are lowered on slopes, see that a safety car is attached to the front end of the trip, with the speed of such car controlled by a governor set at a predetermined speed so that, should the trip break, the dog on the safety car would drop and wreck the trip before it attained excessive speed. (1 per cent.)

(f) Note whether cables or feed wires on main haulage roads are at least 12 in. from any part of cars or mine locomotives, that all cables or wires, except those provided with metallic coverings, are hung on insulators. Observe how lighting wires are connected to the trolley circuit. If such a wire is connected to the lug of the trolley hanger, the latter should be drilled to receive the wire, or, if connected to the trolley wire itself, it should be attached by a special clamp connected to the top part of the trolley wire. Note whether branch circuits at the point where they leave the main circuit are provided with a switch of not less than 100-amp. capacity on each pole, and whether telephone and signal wires are on the opposite side of the road to that on which trolley or other wires are strung. (1 per cent.)

Crosscuts and Stoppings

(g) Note whether crosscuts in entry pillars and in the room pillars of the room-and-pillar system of mining are 35 yd. apart or less and not less than 16 yd. apart. In mines, or portions of mines developed on a system other than the room-and-pillar system, all openings except entries may be driven 50 yd. without crosscuts. Note also whether stoppings in crosscuts between the main intake and the return airways are substantially built of masonry or other incombustible material and are of ample strength. The stoppings in cross entries in non-gassy mines may be built of timber. Observe also whether temporary stoppings have been erected in rooms, to conduct the ventilation to the face of each room, though these may be constructed of timber or brattice cloth. Note whether overcasts have been built of incombustible material or have been driven through the solid strata; whether they have been properly built and of ample strength. (1 per cent.)

(h) Note whether all gears and couplings of pumps are efficiently protected by guards so as to protect the attendant from being caught in them and whether all grease and oil not being used for lubrication has been removed from around the pump machinery; whether the pump, if electrically operated and to be kept in position for a year or more, is housed in an incombustible building or inclosure; whether substations or generator rooms are inclosed in a fireproof masonry building or in an effectively grounded approved steel structure, such building being provided with automatically closing firedoors. However, the automatic features of the door may be omitted if a substation attendant is employed. Observe whether the electric equipment, if containing flammable material, has been placed contrary to law within 8 ft. of a door or opening in any such underground building and whether the building is adequately ventilated. (1 per cent.)

(i) Observe whether all working places are properly secured by props or timber, and whether persons are permitted to work in unsafe places except for the purpose of making them safe. See whether workmen are provided with sufficient props, cap-

pieces, timbers, lagging and wedges, all of which are delivered to their working places and of such size as are reasonably suited to their needs. Note whether props are cut square at both ends as near as practicable to the proper length required or designated for the place where they are to be used. (1 per cent.)

(j) Note whether the coal is properly mined or sheared where necessary before it is blasted and whether a notice has been posted as to the hours at which the blasting shall be done, or whether blasting is permitted as needed. If the places are dusty, observe whether water is used to dampen the dust and have it loaded and taken out of the mine, or whether rock dust is used in place of water. Observe the manner in which explosives are used in the blasting of coal or rock; whether incombustible material is used for tamping; whether tape fuse is used, contrary to law; whether shots are overcharged; kind of explosives used and the manner of storing them in the mine. Note also whether detonators are stored with explosives and whether ample warning is given before shots are fired and whether efficient examinations of the working places are made after each blast; whether more explosives are taken into the mine by the workmen than will suffice for their day's work, providing that quantity is over five pounds. (1 per cent.)

Must Put Air Where Needed

Q.—If 16,000 cu.ft. of air is entering a split in which 60 persons are employed, and an equal volume is returning from the split, does this indicate that the split area is thoroughly ventilated? Give reasons for your decision.

A.—Though more than enough air is entering the split to satisfy the law and the needs of the miners, the split may not necessarily be thoroughly ventilated because the air may be leaking back to the return or may not be systematically coursed to each working face, for lack of proper guiding and directing brattices and curtains. (2 per cent.)

How to Make Siphon Function

Q.—What conditions are required for the successful operation of a siphon?

A.—(1) All joints in the pipe line must be airtight. (2) The suction end of the pipe must be sufficiently submerged in the basin to prevent air from entering the pipe. The discharge end of the pipe, in most cases, should be submerged also, although when the pipe is running full this is not essential. (3) The vertical lift of the suction end of the siphon should not exceed 75 or 80 per cent of the height of water column the atmosphere will support. (4) Where the fall of the discharge end of the siphon exceeds the height of water column supported by the atmosphere pressure, it is necessary so to proportion the diameters of the discharge and suction ends that the flow of water from the summit to the discharge under gravity will not exceed the flow from the supply basin to the summit under atmosphere pressure. When these conditions are fulfilled, the pipe will not empty itself. (5) Even if the discharge of the siphon is not throttled, the air contained in the water frequently tends to accumulate at the summit of the pipe, where the pressure is far less than atmospheric. Especially, will this air escape to the summit if the pipe is not running full. An air trap must then be arranged at the summit to draw off this air as it accumulates. A rapidly running stream of water will carry free air to the discharge. (2 per cent.)

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Chief Mine Electricians' Examination Pennsylvania, 1940*

Electrolysis of Pipes

Q.—What is meant by "electrolysis of pipes," and how is it prevented?

A.—Where a difference of potential between grounded return rails and air or water pipes paralleling the mine tracks is such as to permit the moist ground to conduct current from rails to pipes and also where the current leaves such pipes, electrolysis will occur. This rapidly disintegrates and destroys the pipes. To correct this trouble, rail bonding should be kept in good condition, and rails and pipes should be cross-bonded at frequent intervals. Electrolysis will not occur where good metallic contacts are made. (2 per cent.)

Q.—(a) In a gassy portion of a mine, who is permitted to replace an incandescent lamp? (b) What examination is required previous to replacing such lamp?

A.—(a) Only competent persons shall replace such a lamp. (½ per cent.) (b) In gassy portions of a mine, incandescent lamps will be replaced only after an examination for gas has been made with a flame safety lamp. (½ per cent.)

Q.—How fast does electricity travel?

A.—186,000 miles per second, or at the same speed as light. (1 per cent.)

Q.—A 10-hp. 250-volt motor takes a current of 40 amperes; what is its efficiency?

A.—10 hp. = 10 × 746 = 7,460 watts = output; 250 (volts) × 40 (amp.) = 10,000 watts = input:

$$\text{Efficiency} = \frac{\text{output}}{\text{input}} = \frac{7,460}{10,000} = 74.6 \text{ per cent.}$$

(4 per cent.)

Q.—How would you determine the polarity of a field coil?

A.—By a compass or other instrument of equal or greater accuracy. (2 per cent.)

•

Questions, Mine Examiners' Examination Illinois, 1940*

Spontaneous Combustion

Q.—What gases are produced in a coal mine by spontaneous combustion? What are the probable causes of spontaneous combustion and what general precautions would you adopt to prevent it?

A.—The gases produced by combustion depend on the supply of air. Where this is sufficient for complete combustion, carbon dioxide (CO_2) is formed; if, however, the supply of air is limited so that the combustion is more or less incomplete, some carbon monoxide (CO) will be produced, the quantity depending solely on the limitation of the air supply. In an unventilated place, the oxygen of the air being partly consumed, and the carbon dioxide taken up by the coal, the nitrogen percentage increases.

The primary cause of spontaneous combustion is the oxidation of coal or other carbonaceous material which generates heat, thus in turn increasing the speed of oxidation. This action may be increased by heat generated in the crushing of coal pillars, which also exposes new surfaces to oxidation. Oil and particularly oily wastes are more rapidly oxidized than coal and become heated even more rapidly. Air having ready access to oily rags, paper or cotton waste causes rapid heating of such material, which should be kept out of the mine or inclosed in airtight cans. The danger of spontaneous combustion is peculiarly great where roof or coal is naturally oily or coal piles are deep. Fires are prevented by completely shutting off air by stoppings, but, unfortunately, it sometimes is difficult to do this effectively, as even the pillars will pass air when barometric pressure changes.

Chemistry of Explosion

Q.—Describe the changes that take place in the air of a mine at the moment of an explosion of firedamp.

A.—If the supply of air is plentiful, the oxygen of the air combines with the carbon of the methane in the firedamp and forms carbon dioxide. If the supply of air is more limited, varying proportions of carbon dioxide and carbon monoxide are formed. The oxygen of the air also combines with the hydrogen of the methane gas in the firedamp to form water (H_2O). The nitrogen of the air remains unchanged. Usually some unburned methane also remains after the explosion. The reaction that takes place in this explosion is expressed in the equation

$$CH_4 + 2O_2 + 8N_2 = CO_2 + 2H_2O + 8N_2$$

The numeral standing before each symbol indicates the relative volume of the gas, the symbol alone representing a single volume. Thus, one volume of methane consumes two volumes of oxygen and produces one volume of carbon dioxide and two volumes of water vapor. Ten volumes of air normally contains about two volumes of oxygen with eight volumes of nitrogen, and this relation is used in the equation just quoted. More accurately the relation of oxygen to nitrogen by volume is 1 to 3.775 or 2 to 7.55. Thus 9.55 volumes of air is required to consume a volume of methane.

* Continued from p. 81, June *Coal Age*.

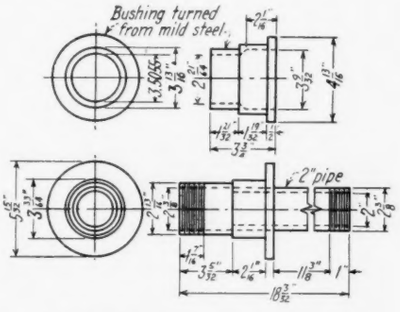
* Continued from p. 80, *Coal Age*, June, 1941.

WHAT'S NEW IN OPERATING IDEAS

Collector-Ring Assembly Altered To Improve Shovel Efficiency

As a result of trouble following the installation of a larger bucket, the 5,000-volt collector-ring assembly on a Marion 5480 shovel used by the Midland Electric Coal Corporation, Atkinson, Ill., was altered as shown in the accompanying illustration, which, with description, was entered in the recent Miners' Exhibit at the American Mining Congress Convention by H. E. Littlepage, electrical engineer, and George Clayton, machinist. The alterations also are adaptable to the Type 350 equipment. No trouble has been encountered in over 18 months of service following installation of the rebuilt assembly.

When the larger dipper was installed it was necessary to increase the pressure of the brushes on the collector rings to prevent arcing, pitting and blistering. The increased pressure, however, tended to thrust the collector rings over away from the brush holders, with the result that the rings were not in a 90-deg. relation with the brushes. Thus, there was contact between only the top part of the rings and the "Metite" brushes. Only



Details of alteration to collector-ring assembly.

about 50 per cent of the contact area of the face of a brush was bearing on the face of the ring.

In the alterations, the bushing (see illustration) was made with a bearing surface sufficiently large to prevent the collector-ring assembly from being pushed over out of its original 90-deg. relation with the "Metite" brushes. Dimensions of the bronze casting machined to fit the bushing are given in the illustration. The casting is shown with the steel tubing screwed into it but without the collector rings and the necessary insulation. The top supporting nut for the entire assembly and the bottom nut which holds the three collector rings and insulation on the steel tubing also are omitted.

The machine work necessary to make the change was done on an extra ring assembly and the bushing was turned out on a lathe ready for installation. During an idle period the supporting casting for the slip-ring assembly was removed from the lower shovel frame and taken to the drill press, where the machinist bored the hole in the casting to approximately 3.5 in. so that the bushing fit snugly. The bushing is longer than the thickness of the supporting casting so that it extends down into the oil reservoir which houses the collector-ring assembly. This insures constant lubrication and allows a closer fit between the bushing and the machined surface on the bronze supporting head of the collector-ring assembly.

"A portable boring cylinder will be used to bore the hole larger in the casting on the lower frame of the 350 shovel when we make the installation. This should cut the installation time down to three to four hours."

•

Mixing Plant Facilitates Boiler-Water Treatment

The accompanying illustration of the mixing and storage equipment for treating boiler water at a power plant of the Bell & Zoller Coal & Mining Co., Zeigler, Ill., was entered in the recent Miners' Exhibit of the American Mining Congress by Lee Hazen, chief chemist.

Make-up water (plant has jet condensers and spray-pond cooling) comes from a large reservoir into which surface water flows by natural drainage. This water receives no treatment prior to going into the boiler-water system. Treatment is handled by giving each boiler a 3-gal. shot of compound (soda ash and trisodium phosphate) every half hour.

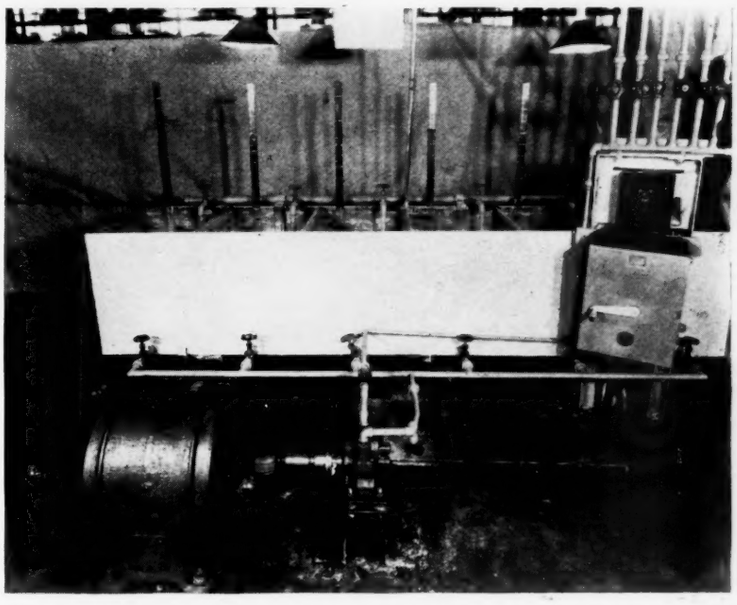
Six rectangular 20-gal. tanks (see illustration) provide the hand-mixing and storage facilities. In each tank is a float carrying an indicator which registers on a calibrated gage standing in plain sight above the tank. The compound is forced into the boilers by a Joy 5-BU loading-machine hydraulic-system pump. Separate intake lines to the pump suction, and from the pump-discharge manifold to each boiler, all fitted with globe valves, provide for pumping from any tank to any boiler. As a rule, however, each tank serves an individual boiler.

•

Washer Water Is Neutralized By Lime at Lake Pump

Hydrated lime now fed regularly into the washer make-up water lowers the acidity and has reduced the corrosion formerly experienced in the 4,000-ton plant of the Sentry Coal Co., near Madisonville, Ky., which prepares strip mine coal. This make-up water, which is introduced in the settling cone and through sprays on the dewatering and classifying screens, is surface water which accumulates in the small storage lake near the plant.

The difficulty first became acute in the summer of 1940, when there was a long period without rainfall. Acidity of the lake



Mixing and storage tanks are in the rear, with the pump and motor in the foreground.

water rose to 170 parts per million. The lime is added at the lake pumping station, which delivers 300 to 500 g.p.m. of make-up to the plant. The usual quantity is 8 lb. per 1,000 gal. and this holds the acidity down to 40 parts per million. To protect also the lake pump, which was a principal sufferer from the corrosion, the lime is added on the suction side of that pump.

In addition to the original layout of two McNally 2,500-g.p.m. centrifugal pumps furnishing water to the McNally-Norton washers a third pump of the same make and size was installed a year ago. All three are now operated at once, thus bringing the total washer circulation to about 7,500 g.p.m.

•

Rotary Trolley-Pole Gouge Does Quick Job Safely

Safer operation plus speed and uniformity are provided by the special lathe equipment for making wooden trolley poles in the Bergoo (W. Va.) shop of the Pardee & Curtin Lumber Co. Instead of turning the pole at a speed of 1,750 r.p.m., which is about the minimum satisfactory for cutting with a stationary gouge tool, the pole is rotated at only 300 r.p.m. This practically eliminates any chance of splinters flying dangerously about, as may take place with high speeds which have a tendency to break a pole if made from slightly defective stock.

As indicated by the illustrations, the cutting is done by a high-speed rotary tool mounted with its motor drive, on the lathe carriage. Poles are made 6 ft. long with a uniform taper from a 2¾-in. diameter at one end to 1¾-in. at the other. This taper is obtained by an offset tail stock. The automatic feed of the lathe is used and the time required to cut a complete pole from 2¾x2¾-in. stock is 4½ minutes.

Outside diameter of the cutter is 5¾-in. and the speed is 8,000 r.p.m. The four blades were formed by cutting notches of

Upper half of the 5¾ in. cutter with guard above. Cutter speed is 8,000 r.p.m.

proper shape in a forged-steel disk 1½-in. thick. The arbor has ball bearings and is driven by a Century 1-hp. 1,735-r.p.m. single-phase motor with single-strand V-belt connection. G. W. King and J. J. Ervin, of the shop force, designed this trolley-pole machine. The cutting tool is fitted with a heavy guard but the pole is without a guard, thus facilitating removing and setting-up operations.

•

Louver Ducts Increase Speed Of Drying Wetter Sand

If several ventilating pipes or ducts arranged vertically or nearly so are installed in a locomotive sand dryer to aid the escape of steam, the time of drying a rather wet sand is materially speeded. An ordinary 1-in. steel pipe with many holes drilled through its wall will vent some of the steam. A more efficient vent is one with bottom entrance holes so that there is only very loose sand next to the vents and sand cannot enter the duct.

Suggestions for making a sand-dryer duct are set forth in the accompanying drawing. Material is ¼-in. steel and the assembly is made by arc-welding. Two plates are cut 2 in. wide and as long as the duct. Next, a number of 3x4-in. plates are cut from the material. Each small plate is then bent to

Q. E. D.

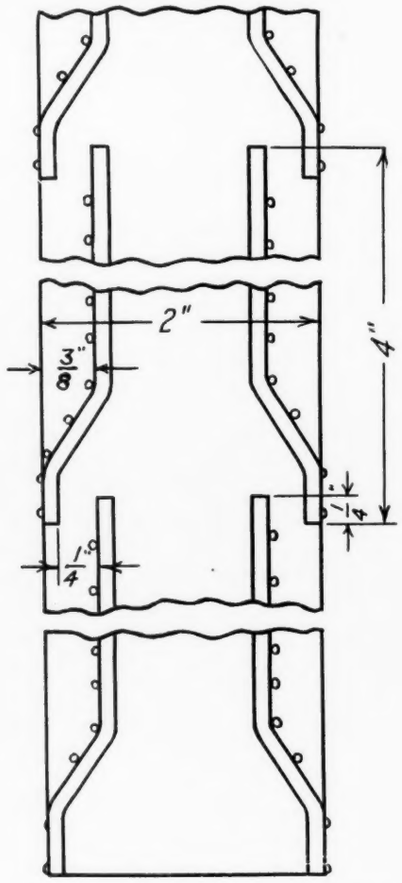
Q. E. D. (Quod erat demonstrandum) at the end of a geometry problem signifies successful proof of its solution. In coal mines, Q. E. D. may well mean a successful demonstration of a method of improving efficiency, cutting costs or promoting safety in any one of a large number of ways. Coal Age reserves this Operating Ideas department for such solutions of operating, electrical, mechanical or safety problems. So if you have one, here is the place for it. Send it in, with a sketch or photo if it will help to make it clearer. For each acceptable idea, Coal Age will pay you $5 or more on publication.

form a louver at the bottom, as indicated in the drawing. The assembly is started by laying one of the long plates flat on the bench, then standing the louver plates on edge on it as shown. The welding need be only "spots" spaced an inch or so apart.

To complete the duct the other plate is clamped to the top, or open, side (see drawing) and then is "spotted" to the other sides of the louvers. Dimensions of this duct, roughly 2x3¼ in., may be unsuited to certain dryers. Without changing the size or shape of the louver plates, the duct may be assembled to a thinner dimension by using 1½-in. instead of 2-in. side plates.

If the ducts are installed on 12-in. centers

Owen Luikart, workman in the Bergoo shop, has started the cutter, which completes a trolley pole in 4½ minutes.



First step in assembly of sand-dryer duct.

Exide

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
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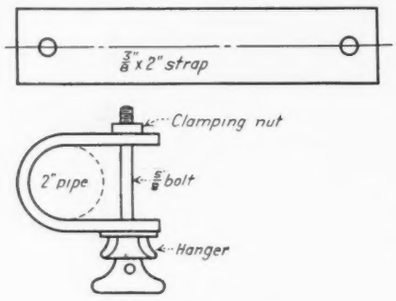
so that steam need not travel more than 6 in. horizontally through the wet, packed sand, the drying will be materially speeded.

•

Adapter for Mounting Hangers Fits Over Pipe Suspension

Remarking that it has given satisfactory service for over a year, John Gross, electrician, J. H. Somers Coal Co., Adena, Ohio, offers the adapter shown in the accompanying illustration for mounting trolley hangers on a pipe suspension on an outside tramway. To make the adapter, $\frac{3}{8}$x2-in. flat iron is drilled as indicated and then is bent to fit a 2-in. pipe. The adapter is clamped to the pipe by screwing down the clamping nut on the hanger bolt.



Details of adapter.

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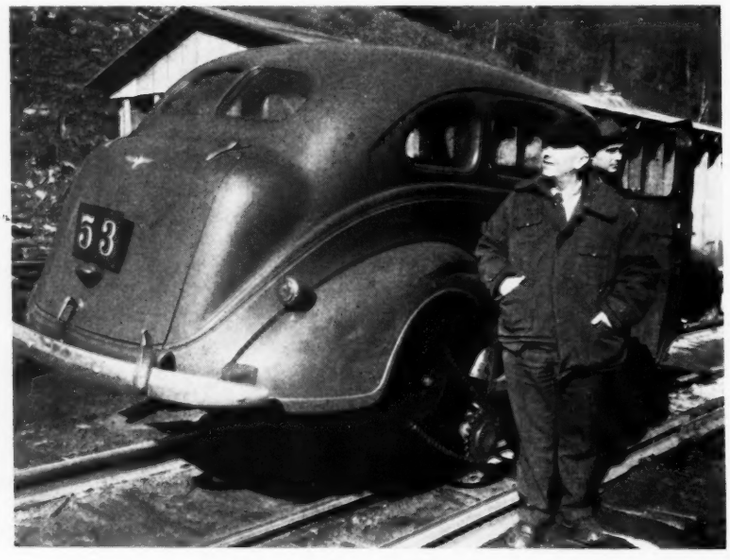
Auto Used on 36-in. Gage Without Axle Changes

Many coal mines are accessible only by railroad, at least during the winter months, and so can profitably use a reliable track-type car in transporting officials and emergency supplies. A 36-in.-gage motor car used by the Pardee & Curtin Lumber Co., Bergoo, W. Va., cost no more and has none of the numerous disadvantages of the typical gasoline speeder.

This car is a standard 1934 Plymouth automobile with disk wheels and rubber tires removed and the whole car complete with springs, axles and original hubs then set on a frame consisting of a rectangle of 4-in. angles supported on two non-steering axles with flanged wheels. Sprockets are bolted to the original rear wheel hubs of the car and roller chains applied from those to sprockets on the axle of the rear truck. Thus, the motor car operates through the regular three-speed transmission and reverse of the automobile. The steering arm is disconnected, however, and instead is linked to a system of rods and levers so that turning the automobile steering wheel clockwise applies brake shoes to the flanged wheels.

Headquarters for the car is the Bergoo shop, which is at the end of the highway, where the company operates a large sawmill. Two of the coal mines are up valleys beyond, and, since the company's lumber roads are 36-in. gage, a third rail was installed on the standard-gage tracks serving those two mines. Thus the motor car can be used for both lumber and coal supervision and errands.



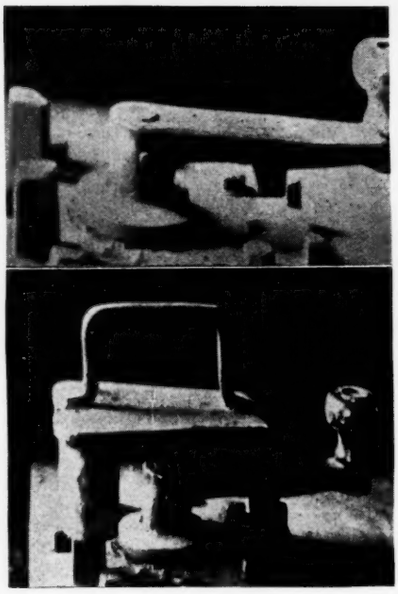
Motor car parked at foot of man-and-supply incline, Bergoo No. 3 mine.

•

Locomotive Controller Guard Drops Over Handle

For storage-battery locomotive controllers of the type illustrated, Lee McTigue, electrician, Heisley Coal Co., entered a safety guard in the Miners' Exhibit at the recent American Mining Congress convention. This type of controller does not use a reverse cylinder and therefore cannot be locked in neutral by means of a reverse lever. When the locomotive is idle, as when standing in a repair shop, the controller handle can be accidentally moved to forward or reverse position. To prevent this, the guard in question was developed.

The guard is made of sheet steel to which two cylinders and a prong are welded. The cylinders fit over the posts on the controller case and the prongs of the fork drop over the controller handle, thus locking it effectively in neutral position. Each locomotive is provided with one of these guards, which the motorman drops over the controller handle before leaving it idle.

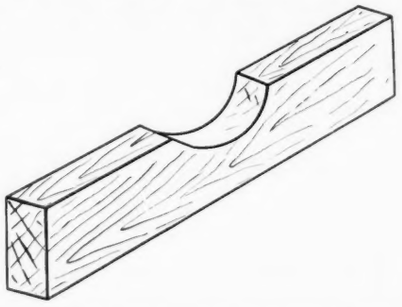


Above, view of controller without reverse cylinder and lever; below, showing guard in position over controller handle.

•

Pillow Block With Cutout Helps Timberman

To help the timberman hold a prop or timber in place while dressing it, George T. Fisher, Ronco, Pa., suggests the pillow block shown in the accompanying illustration. The block is cut out as indicated to receive the prop and keep it from rolling during the dressing operation.



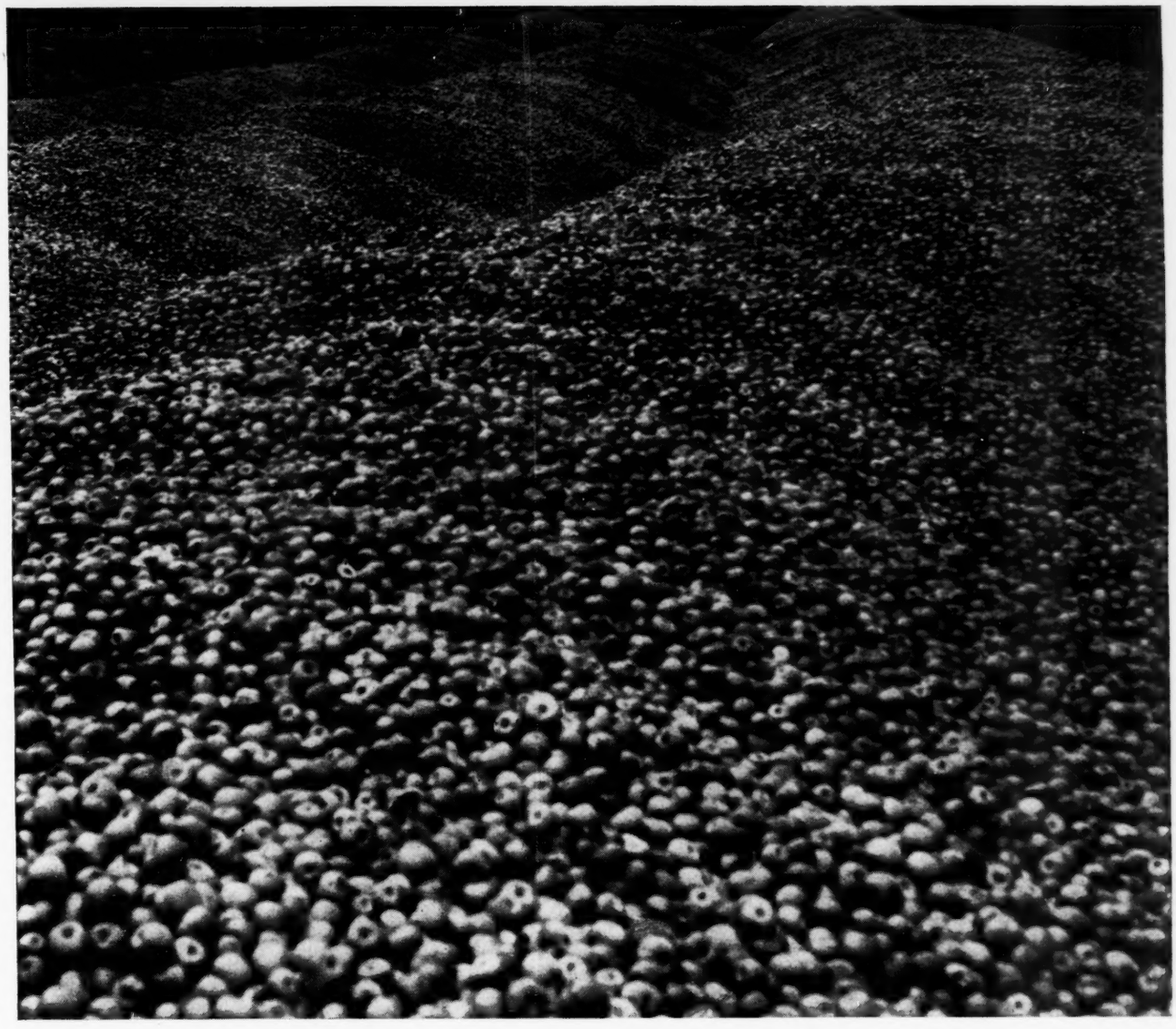
This pillow block keeps timbers from rolling.

•

Welded Grid Joints Stop Heating

Welding the joints of cast-iron grid resistors used in the secondary control of the 150-hp. 2,300-volt hoist motor at an Illinois mine shaft eliminated loose contact troubles which had been occurring every few months. As often happens with old-type resistors, expansion and contraction gradually relieved the compression, with resultant heating of the contacts between grid terminals. This hastened corrosion, which in turn produced greater heat and finally caused arcing.

Modern resistors for heavy duty are fash-



That's a lot of applesauce but it's rubber's dish

A typical example of Goodrich improvement in rubber

MOUNTAINS OF APPLES like this used to be wasted every year. Then somebody added canned applesauce to America's diet, and the fruit was saved.

But to make the best sauce, apples have to be picked ripe. That means quick processing before they spoil. This vital speed is provided by conveyor belts. From storage to washing, grading, cutting, cooking, Goodrich conveyor belts, like long traveling platforms, have carried millions of apples that were made into hundreds of tons of applesauce.

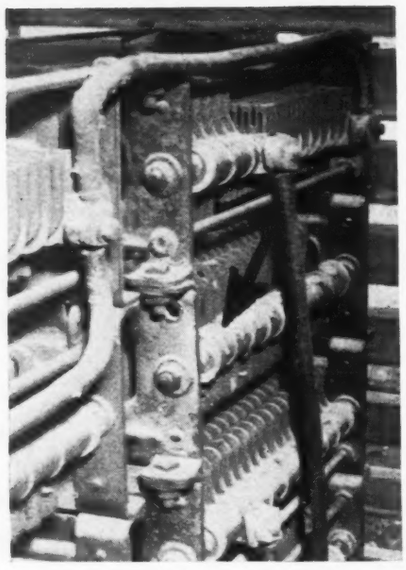
While the apple rush is on, there's no time for belt repairs or even care; a breakdown might let thousands of dollars' worth of apples spoil; the belts have to operate in spite of being soaked in fruit juice acids. B. F. Goodrich engineers studied the problem, recommended the exact belt for the job. Strangely enough it was similar to a belt they had developed for use in stone quarries where it had to take constant abuse under all sorts of working conditions and still not break down.

These B. F. Goodrich belts went into one, then many applesauce plants. They have been working for years without a failure, rushing apples from field to can to freight car at low cost.

Because of their long and intimate experience with the tough problems of many industries, B. F. Goodrich engineers are good men to know whether your worry is something new or how to increase production or how to reduce costs. To get their help all you need do is call your Goodrich distributor or write *The B. F. Goodrich Company, Mechanical Goods Division, Akron, Ohio.*

B.F. Goodrich
First IN RUBBER

(Another story of Goodrich development work appears on page 1)



Arrow points to a weld joining grid terminals.

ioned from continuous strips of metal. Instead of rebuilding the grid resistors, Chief Electrician E. E. Rose hit on the permanent and much cheaper method of welding grid contacts together and thus obtaining in effect a modern-type resistor. Without taking the grids apart the joints were cleaned for about one-quarter of the circumference with a three-cornered file and the resulting notch was filled with bronze weld applied by gas torch.

•

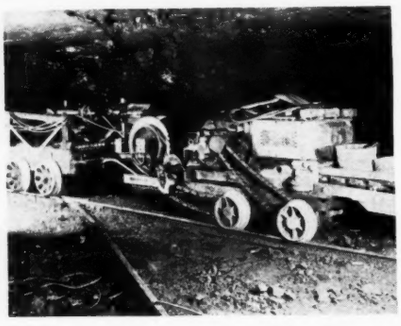
Jig Facilitates Reclamation Of Reel Carriages

A jig for use in reclaiming Goodman 2600 locomotive reel cartridges is shown in the accompanying illustration. It was submitted by Victor Exner, Barton, Ohio, who points out that this part costs $26 when new and can be rebushed at a cost of $7.60. Cost of making the jig, which can be used over again, is $20, most of which is labor, as all the parts were taken from the scrap pile.

•

Drill Truck Moved About By Cutting Machine

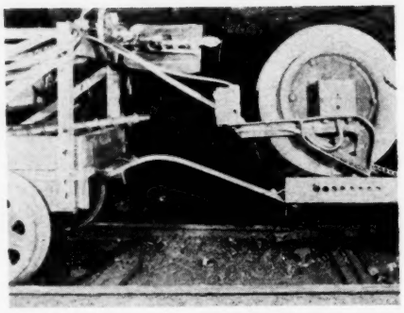
"As in most mines," writes Julius Asbridge, driller and cutting-machine operator at Zeigler No. 2 mine, Bell & Zoller Coal & Mining Co., Zeigler, Ill., "our development work is done by a small gang of four or five men who cut, drill, load and gather all the coal mechanically. Usually, the under-



Truck being pulled by machine in moving from one place to another.

cutting and drilling are done by the same two men in one visit to the place.

"Cutting machines, when moving from place to place, usually are crowded with jack pipes, skids, bits, shovels and blocks, leaving no room for the drilling apparatus. To overcome this, my buddy and I hit on the idea of hauling with the cutting machine a regular drillers' truck, on which we could carry the drilling apparatus. We fastened them together with a regular track-switch bridle bar, which was made of ⅞x2-in. channel 37 in. long, the actual coupling being made with a bolt at each end."



Close-up of coupling.

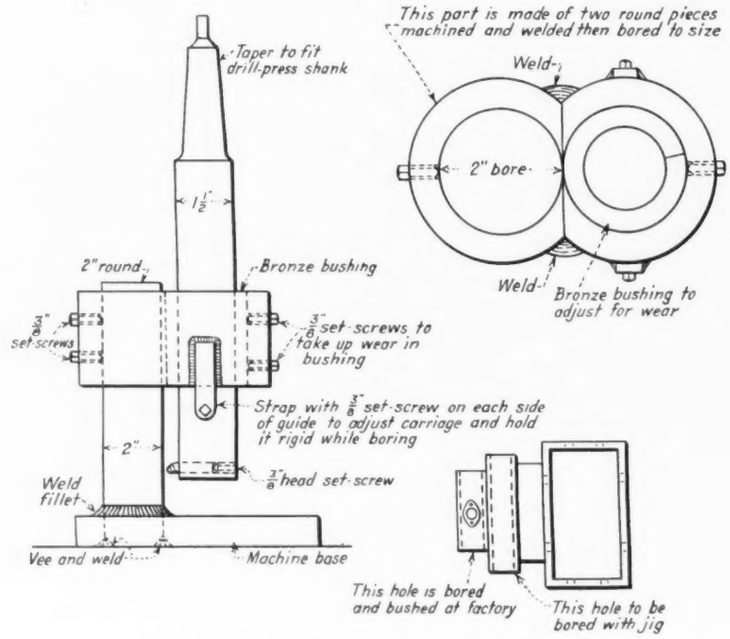
•

Glass Guards Wheels In Electric Shop

To eliminate the chance of an eye injury by flying particles, E. E. Rose, chief electrician at an Illinois mining company, wanted a guard for the electric shop utility grinder which could be permanently attached to the grinder, of the semi-portable type. Also, it was desired that the guard be conveniently adjustable for any type of work. The answer was a no-draft section of a front window from a Chevrolet 1934 car, which is mounted as shown in the illustration, in which Mr. Rose is demonstrating the use of the shielded grinder.

An efficient guard for a semi-portable grinder.

The main supporting bracket is pivoted on the base at a point back near the motor. The angle of the support is adjusted by a sliding brace extending down to a pivot on the base at the right-hand side. Angle of the glass frame with respect to the bracket is adjustable by another sliding brace on the left-hand side. In this case the brace is from a pivot on the upper end of the glass frame down to the adjustable slide on the bracket.



Details of jig for reclaiming locomotive reel carriages

WHAT'S NEW IN THE FIELD

Southern Bituminous Operators Accept Peace To Further Defense Program

SOUTHERN bituminous coal operators capitulated on June 9 and, with Northern producers and the United Mine Workers, accepted recommendations of the National Mediation Board for adjusting the Appalachian wage controversy and thus removed the threat of another suspension of mining which would have had disastrous effects on defense program production. The mediation board's recommendations, presented on June 5, urged compliance with most of the union's demands, and set a deadline of 6 p. m., June 9, for compliance or rejection. Each group sent its reply by messenger a few minutes before the prescribed time.

In waiving the 40c. wage differential retroactive to May 1, the Southern operators accepted reluctantly, declaring in a letter to the mediation board that they did so only because President Roosevelt "proclaimed a state of total national emergency" and because they desired to do "everything in our power as patriotic citizens to further our own defense program."

Northern operators and John L. Lewis, U.M.W. president, accepted with only minor reservations on wording and interpretation of the contract. William H. Davis, New York attorney and mediation board vice chairman, headed the panel which heard the case. Walter Teagle, former president, Standard Oil Co. of New Jersey, and Clinton S. Golden, regional director, Steel Workers' Organization Committee, were the other members of the board.

Formal signing of the agreement by eight northern Appalachian operators' associations and the United Mine Workers took place at a joint conference on June 19. Motion to adopt the contract, in effect from April 1, 1941, to March 31, 1943, was made by Charles O'Neill, president, United Eastern Coal Sales Corporation, and spokesman for the Northern producers, and was seconded by Mr. Lewis.

Besides elimination of the wage differential, the miners' union won its demands for elimination of the "reject" clause under which miners were docked for coal considered by the operators as not clean enough for marketing, and for annual vacations with pay of $20. The mediation board suggested, however, that because of the emergency this year the miners receive a bonus of $20 instead of a vacation which would curtail coal production, unless the industry could work out a method of making up the lost tonnage. Under the new agreement, which will be effective until March 31, 1943, the basic daily wage rate for the entire Appalachian area will be $7, whereas under the contract which expired last March the Northern rate was $6 and the Southern rate $5.60.

In accepting the mediation board recommendations, L. Ebersole Gaines, president of the New River Co., and chairman of the Southern conference, wrote June 9 as follows:

"We do not acknowledge the correctness of your statements of facts, nor do we admit the soundness of your conclusions. On the contrary, we deny both. However, since these negotiations have been in progress the President of the United States has proclaimed a state of total national emergency, and we will do everything in our power as patriotic citizens to further our defense program. Therefore, in this emergency, we have decided to accept your recommendations and are ready to immediately apply them to our contracts with the United Mine Workers."

Mr. Lewis wrote that on June 5 the union policy committee by unanimous standing vote adopted a resolution accepting the recommendations "in principle, with reservations affecting form, fact, detail and technical application." The recommendations, Mr. Lewis said, would form the basis "for renewed negotiations with the dissenting operators."

Mr. O'Neill and J. B. Morrow, president, Pittsburgh Coal Co., accepted on behalf of the Northern operators in a five-page letter which raised some technical objections and questions of interpretation.

Southern operators held sessions with union representatives throughout the second and third weeks in June without reaching a final settlement on details. In connection with these separate sessions it is recalled that the Southerners said they would not rejoin the Appalachian conference, from which they withdrew when the Northern operators granted the union an increase of $1 a day, if the union would hold out for elimination of the 40c. differential.

Nearly 300 operators from the anthracite producing counties of northeastern Pennsylvania and the United Mine Workers, represented by international and district officers, formally signed their new agreement on June 20 at Hazleton, Pa. The pact, which was ratified by the mine workers by a 7-to-1 vote, will run until April 30, 1943. With the new contract taking effect the Anthracite Board of Conciliation began its 39th year in the settling of grievances in the industry. Dr. Thomas E. Larkin was reappointed umpire by the board, which includes: for the operators, W. W. Inglis, president, Glen Alden Coal Co., chairman; J. B. Warriner, president, Lehigh Navigation Coal Co.; and J. B. Sharp, in charge of labor relations, Philadelphia & Reading Coal & Iron Co. For the miners, Michael J. Kosik, president, District 1; Hugh V. Brown, president, District 7, and Martin F. Brennan, president, District 9, U.M.W. John J. Boylan was reappointed secretary.

Wide World Photo

John L. Lewis and Charles O'Neill, representing the mine workers and Northern bituminous operators respectively, extend mutual congratulations on formal adoption of new working agreement.

"ON THE JOB" WITH COAL MEN ACROSS THE LAND

William Schlessinger, general superintendent, Victor-American Fuel Co., with Arthur Cupon, tipple boss, and Walter Oldendahl, superintendent, Pinnacle mine, Oak Creek, Colo.

J. M. Freeman, vice president and general manager, and W. A. Romek, assistant manager, Montana Coal & Iron Co., Washoe, Mont.

Forest Luellen, master mechanic; Tony Skufca, mine foreman; Henry Johnson, superintendent; and Clyde Hurst, mine foreman, Wadge mine, Victor-American Fuel Co., Mt. Harris, Colo.

enry Hart, hoisting engineer; J. H. Patterson, clerk; Wilm Gregory, night foreman; Clarence Clair, day foreman; d Tom Barclay, superintendent, Gordon (Colo.) mine, Gordon Coal Co.

Ralph Beckwith, section foreman, Bergoo (W. Va.) No. 2 mine, Pardee & Curtin Lumber Co.

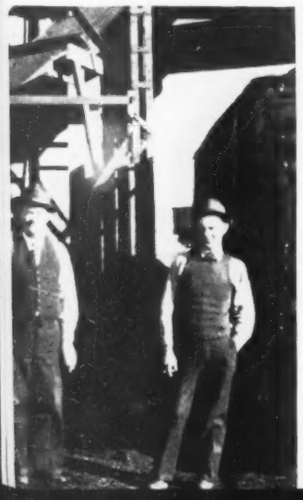
J. W. Murrell, master mechanic and outside foreman, Cottonwood Coal Co., Giffen, Mont.

A. Steinmasel, master mechanic; W. J. Freeman, chief electrican; W. R. Freeman, superintendent, and S. G. Carpenter, tipple foreman, Smith mine, Montana Coal & Iron Co., Washoe, Mont.

R. M. Bottomley, chief engineer; A. K. Perry, master mechanic and outside foreman; and C. M. Shott, general superintendent, Sheridan-Wyoming Coal Co., Monarch, Wyo.

Cecil Guthrie, superintendent, Seneca Coal & Coke Co., Broken Arrow, Okla.

. G. Johnson, vice president, aris Purity Coal Co., and Frank eckman, superintendent, Paris Washery Co., Inc., Paris, Ark.



Frank Chufar, superintendent, and Leo Bregar, vice president, Hickory Coal Co., Tulsa, Okla.

A. W. Newcomb, superintendent; L. Hildebrand, top boss; M. R. Stevenson, master mechanic; and J. H. Smaller, blacksmith, McNeil Coal Corporation, Dacono, Colo.

ith shop staff, Montana Coal & Iron Co., Washoe, ont., with A. Steinmasel, master mechanic; S. G. Carpen-r, tipple foreman; and W. J. Freeman, chief electrician.

Hugh Price, superintendent, and Melvin Dearth, pit foreman, Braidwood mine, Wilmington Coal Mining Corporation, Morris, Ill.

George W. Reeves, president, Excelsior Coal Co., Hackett, Ark.

George Bonovich, section foreman, Bergoo (W. Va.) No. 2 mine, Pardee & Curtin Lumber Co.

Part of the top force at the Oliver Coal Co., Somerset, Colo., with A. T. Wiley, outside foreman (third from right).

Frank Heath, superintendent, Big Chief No. 10 mine, Robert Gage Coal Co., Unionville, Mich.

R. K. Buzzard, general mine foreman, Bergoo (W. Va.) No. 2 mine, Pardee & Curtin Lumber Co.

Joe Dowling tipple foreman, and Robert Buchanan, chief electrician, Keystone Coal Co., Routt, Colo.

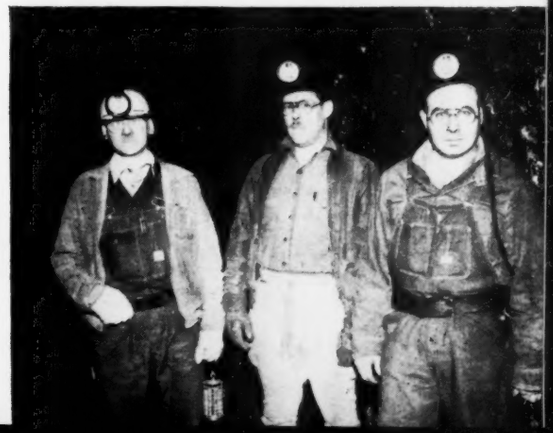
SNAPPED BY COAL AGE ROVING EDITORS AT THE MINES

W. Wintle, Ralph Crain and C. W. Cansdelle, maintenance men, West Mineral (Kan.) preparation plant, Pittsburg & Midway Coal Mining Co.

James Catteral, foreman, Monarch mine, Sheridan-Wyoming Coal Co., Monarch, Wyo., with M. C. McCall, U. S. Bureau of Mines, Salt Lake City, Utah, and S. E. Upton, section foreman.

B. H. Cutright, safety engineer, Pardee & Curtin Lumber Co., Bergoo, W. Va.

William Egry, outside foreman, and Ben F. Snyder, mine clerk, Wadge mine, Victor-American Fuel Co., Mt. Harris, Colo.



Hazards Incidental to Mechanical Loading Aired by Inspectors at Bluefield

MINING HAZARDS, as accentuated or lessened by mechanization, and what to do about them kept the Mine Inspectors' Institute of America busy during the two days devoted to technical discussion at the 32d annual convention of that body held June 2-4 at the West Virginian Hotel, Bluefield, W. Va. Thomas Moses, first vice president, occupied the chair, with the occasional assistance of Fred Ferguson, third vice president. The second day was devoted to a trip to the Claytor dam, reservoir and 104,000-hp. electric plant of the Appalachian Electric Power Co. on the New River, four miles south of Radford in southwestern Virginia.

Outstanding among problems of mechanized mining is control of dust, asserted E. J. Weimer, division superintendent, Koppers Coal Co., Grant Town, W. Va. To allay coal dust, water or a chemical wetting solution, such as Aerosol, Sealtite or Compound M may be sprayed on cutter bars. For this purpose a tank and pump may be mounted on the cutter bar or, where spray lines are available, flexible hose, attached to the cutter bar, can be used to deliver this water. The spray may be applied on the cutter bar as the latter either enters or leaves the kerf, or the water may be sprayed at the head end of the bar.

The coal, when shot, may be wetted down prior to loading, usually with water from sprinkler lines which are carried to all faces. In some instances, the coal may be sprayed again as it is being discharged into the shuttle car, but this is not customary if the loose coal has been well wetted before loading. If an elevating conveyor is used for loading into mine cars, the coal may be sprayed again as it falls into the hopper of the elevator, and even once again where the elevator discharges its load.

Eliminate Dust Hazard

Haulways should be sprinkled with water, or flake calcium chloride should be spread over the floor to absorb moisture from the air and pack the dust into a firm, hard surface. But, even then, some loose dust will be present, and this, by a heavy application of rock dust, must be prevented from taking part in an explosion.

The transfer point must be located always in fresh air, as an elevating conveyor, car-spotting hoist and a locomotive will be operating around that point. Though the charging station must be conveniently located, it always should be placed on a fresh-air split. It would be dangerous to pass return air over such equipment and, in case of electrical trouble, the separate split would prevent smoke or fumes from being carried to the working faces.

Because of the rapid advance of the workings, how to maintain sufficient stoppings and checks is a problem. Stoppings should be fireproof, but not as substantial as if planned for a longer life. They may be constructed of concrete blocks laid dry and covered with thin plaster so as to make removal easy. Because of the large number of roadways used, many canvas checks will be necessary. These must be of heavy material and well built.

These checks, in turn, introduce a collision hazard, much more pronounced than with track equipment, for, with rubber-tired trackless equipment, no one knows at any time where these units may be traveling. Because of the dust and the rapidity with which fresh coal faces are exposed, a sufficient ventilating current must be maintained right up to the face by erecting line brattices inby the last open crosscuts.

Caterpillar trucks are hazardous especially to feet and legs, for, unlike track equipment, they have no predetermined course of travel. Therefore, workmen must see that they have ample clearances. Today, to caterpillars have been added much rubber-tired equipment, shuttle cars, rock dusters and mounted drills. All this uncharted and rapidly moving equipment creates hazards, mainly those of collision with other equipment, ribs, posts or men. As shuttle cars are powered by two large and heavy storage batteries, they must be carefully handled to avoid injury to workmen.

Being a novelty, men other than the regular operatives are tempted to run these cars, and they are not so easy to operate as would appear at first sight. The Koppers company trains its drivers prior to actual operation, taking them into the mine on Sundays.

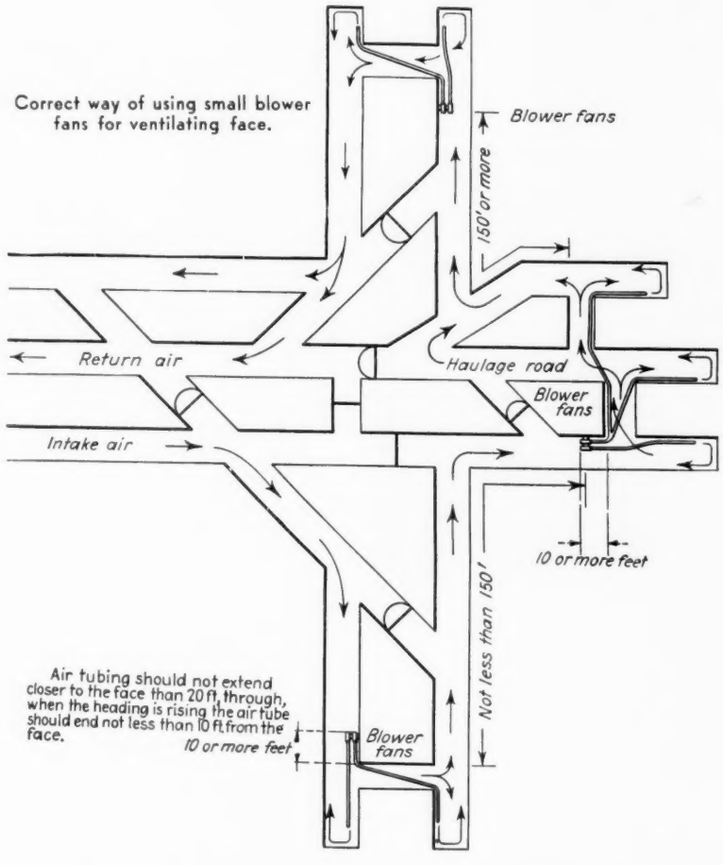
With shuttle cars, timbering details need modification. Being 6 ft. 6 in. in over-all width, 21 ft. in over-all length, with a wheelbase of 8 ft. 2 in., much clearance must be provided for the safe and efficient operation of such cars. At intersections, crossbars are set on posts located at corners of the coal rib and as close to the rib as possible.

All posts are placed against the rib, except those at the immediate working face. There, safety posts are set as the coal is loaded out. Immediately back from the face, temporary or permanent crossbars are set. If temporary, they are steel H-bars, set on jacks so that they can be moved easily as faces advance. If more permanent, they are timber headers and set on posts. In pillar work, heavy cross headers on posts are used exclusively, but, at the car-loading points or elevating conveyors, where top is tender and has to be shot for headroom, heavy steel bars are used for roof support.

Power is carried to the operating equipment through the last crosscut by 4/0 insulated wire with permissible junction boxes at intervals, so that cables can be plugged in. No bare copper is used except the trolley wire, and this is extended only to the elevating conveyor, which is in fresh air. Locomotives do not go inby the loading point. Rubber-tired equipment will not sever a cable if it travels over it, but the insulation will be weakened eventually so that it will fail and the cable blow up. All cables on traveling ways, therefore, should be suspended from the roof.

Shuttle cars operated on tracks, declared J. T. Ryan Jr., president, Mine Safety Appliances Co., reading an article by David W. Jones, superintendent, Princeton Mining Co., Princeton, Ind., can be introduced without sacrificing any of the safe and desirable practices already established in mining operations.

At three mines in the Fulton-Peoria field



where auxiliary fans are used the inspector has recommended that the fans be equipped with a short angle bonnet so turned as to make it difficult for air returning from the room to be drawn into the fan, and that tubing extensions be so made as to keep the air at such a distance from the face that it will not chill the workmen, added R. M. Medill, director, Department of Mines and Minerals, Springfield, Ill.

With 30-ft. tubing extensions, the end of the tubing should be from 40 to 70 ft. from the face and, with 50-ft. lengths, from 40 to 90 ft., for at these distances the air current cannot arrive at the face in such concentration as to blow coal dust into the air. The accompanying sketch shows a plan for auxiliary ventilation having Mr. Medill's approval.

At the working face, asserted J. A. Saxe, chief engineer, Island Creek Coal Co., Holden, W. Va., the air should be conducted always from solid places to places on retreat. Thence, part of the air should be passed into the return and part across the goaf through bleeders. As far as practicable, line brattice should be avoided, and, where used, the current of air thus conducted should be vigorous enough at its discharge to turn the blades of an anemometer. Wood and doubled canvas stoppings are used more generally in mechanically loading than in hand loading, and, for the short length of service, this kind of stopping is not objectionable.

Hazards Measured

Places having ignition hazards should not be worked if the proportion of methane in them exceeds 0.5 to 0.75 per cent. In splits having no ignition hazards, 1 per cent of methane may be permitted, but a higher percentage occasionally may be justified. However, provision should be made to restore the proportion of methane to 1 per cent as promptly as possible.

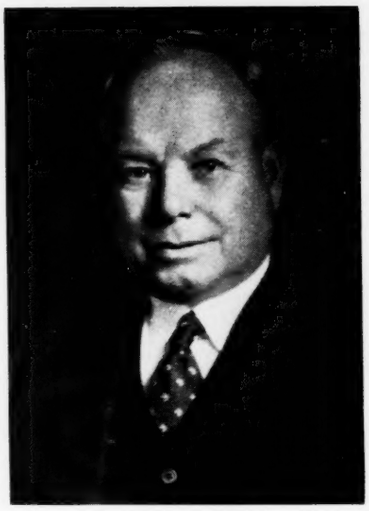
All air pressures must be adjusted so that, with the failure of a stopping, the air from a high-pressure return split will not flow into the intake of a weaker split. In a mechanically operated working three to six times as much air is needed as in a similar hand-operated place, because of the greater quantity of coal broken down in the more rapid advance with mechanical loading.

About 217.24 is the accident frequency rate for haulage when based on the number of million man-hours worked by the men engaged in the hauling of coal, was the striking statement of Clyde L. Lutton, safety director, H. C. Frick Coke and associated companies, Pittsburgh, Pa.

No one should travel in the last cars of a trip on a plane, if the drag would derail the cars seriously in the event of a breakaway, asserted Thomas Allen, chief inspector of coal mines, Denver, Colo. Further remarks of Messrs. Jones, Lutton and Allen will appear in an early issue, in the Foremen's Forum section.

Coming Meetings

- Southern Wyoming Coal Operators' Association: annual meeting, July 8, Cheyenne, Wyo.
- National Safety Council: 30th National Safety Congress and Exposition, Oct. 6-10, Stevens Hotel, Chicago, Ill.
- Fifth annual joint Fuels Conference under auspices of Coal Division of A.I.M.E. and Fuels Division of A.S.M.E., Oct. 30 and 31, Hotel Easton, Easton, Pa.



Thomas Moses, institute's new president.

Disasters Analyzed

In a symposium on recent mine disasters, J. W. Fitzjarrel, State mine inspector, Department of Mines, Fort Smith, Ark., said that the explosion in the mine of the Bates Coal & Mining Co., Aug. 27, 1940 (*Coal Age*, October, 1940, p. 192), was caused by the igniting of methane from a pocket, the gas in which was released by an electric cutting machine. The gas was ignited either by an open switch on a coal cutter or by a match. The machine had been switched off, but matches were found in the pockets of some of the victims.

Describing the Willow Grove disaster of the Hanna Coal Co., Neffs, Ohio (*Coal Age*, May, 1940, p. 66, and June, 1940, p. 94), Marcus Kerr, now, but not at the time of the disaster, chief, Division of Mines, Columbus, Ohio, stated that contributing causes were the shortening of the air current in the winter with consequent drying of an already dry mine, absence of rock dust in the territory where the explosion occurred and use of black powder, which was the primary cause of the explosion, whether the blast originated from a blow-out shot or was due to the explosion of a powder magazine.

The Ohio & Pennsylvania Coal Co.'s explosion of Nov. 29, 1940, at Cadiz, Ohio (*Coal Age*, January, 1941, p. 96, and February, 1941, p. 117), occurred, Mr. Kerr asserted, in perhaps the most gassy of the active mines of the State, making 3,000,000 cu.ft. of methane every 24 hours, and having two 495-ft. shafts. Most of the gas comes from the limited sections where clay veins or faults are penetrated. Oil and gas wells also honeycomb the area. It is one of the few mines in Ohio having intake air on the motor road.

A bank of rooms had cut into a clay vein which liberated large quantities of methane. A move necessitated the splitting of an air current which was probably already none too

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Insure Safety—Ground your loaders, conveyors, cutters. Anaconda's 2-conductor parallel with ground wire affords a simple, effective method. An especially constructed flexible ground wire surrounded by a securely anchored rubberized duck tape, prevents short circuits of conductors due to mechanical abuse. This new 2-conductor parallel cable with ground wire has only slightly increased diameter; usual lengths may be accommodated on standard conductor reels.

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adequate to clear methane from the coal face, and the revision of the ventilation made necessary the use of large quantities of line brattice and many doors, which probably contributed to the disaster. Mostly a gas explosion with incomplete combustion, carbon monoxide killed all the victims with only superficial burns and no dismemberments. About 200,000 cu.ft. of carbon monoxide was driven out of the small explosion area when that area was ventilated.

Ascribing the explosion of July 15, 1940, at the Sonman "E" Slope Mine of the Sonman Shaft Coal Co., at Sonman, Pa. (*Coal Age*, October, 1940, p. 188), to a roof fall that drove methane into an intake motor road from a room that 40 minutes before had been found clear of methane, R. D. Joseph, State mine inspector, declared that the methane was ignited by a trolley locomotive. The pillar of the room which caved had just been drawn back its full length, and the men had left for a new place. Sixty-three men were killed. Of these, 41 with their supervisor waited in vain for rescue. Seven barricaded themselves but failed to remain in the barricade. Others attempted to barricade with insecure canvas checks, behind which, however, they did not stay.

Three major coal-mine explosions in West Virginia from the disaster of the Bartley mine of the Pond Creek Pocahontas Coal Co., Jan. 10, 1940 (*Coal Age*, February, 1940, p. 108, and April, 1940, p. 104), to that of the Carswell mine of the Koppers Coal Co., at Kimball, Jan. 22, 1941, occurred almost within a year after years of freedom from such occurrences, asserted N. P. Rhinehart, chief of West Virginia Department of Mines. All occurred in the low-volatile smokeless field in the south of the State and all were using hand-loaded conveyors.

The Bartley mine liberated 6,000,000 cu.ft. of methane every 24 hours, with substantial increases after pillar falls. Softness of coal increased the dust hazard. Daily production had been doubled in a few months prior to the explosion. Though there were bad prac-

Cabinet for 1941–1942

Thomas Moses, ex-president, H. C. Frick Coke and associated companies, Pittsburgh, Pa., president; N. P. Rhinehart, chief, Department of Mines, State of West Virginia, Charleston, W. Va., first vice president; Fred Ferguson, director, Bureau of Mines and Mining, Indianapolis, Ind., second vice president; Patrick A. Grady, general superintendent, Carrs Fork Coal Co., Inc., Allock, Ky., third vice president; C. A. McDowell, director, industrial labor relations, Vesta Coal Co., California, Pa., secretary; J. J. Forbes, supervising engineer, safety division, U. S. Bureau of Mines, Pittsburgh, Pa., assistant secretary; J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines, Annapolis, Md., treasurer; James W. Paul, mining engineer, Pittsburgh, Pa., editor-in-chief; Richard Maize, Secretary of Mines, State of Pennsylvania, assistant editor-in-chief; James T. Beard, editor emeritus; R. Dawson Hall, engineering editor, *Coal Age*, publicity editor.

tices and conditions at the mine, the practices were far better than average for the State and county in which the mine is located.

Over 4 lb. of rock dust was used for every ton of coal removed, and the mine until the disaster held one of the "few and enviable accident records of the State of West Virginia and even the entire United States." However, the permissible electrical machinery was not in permissible condition and cables in many instances were not in very good order.

No. 4 mine of the Raleigh Coal & Coke Co., the scene of an explosion Dec. 17, 1940 (*Coal Age*, January, 1941, p. 90, and March, 1941, p. 90), had been worked as a non-gassy mine for 35 years and the air had to be short-circuited for hours to get a dangerous accumulation. Enough air was supplied but it was improperly distributed. In the entry where the explosion occurred were three gob and four canvas stoppings and two open crosscuts. Haulageways were rock-dusted but not active working sections. Electric cap lamps were used, but smoking was permitted.

At the extremely gassy and dusty Carswell mine, 5 lb. of rock dust was used per ton of coal mined and in the explosion only five persons were killed. Some men testified that they saw the explosion start from a fused hook nip placed, contrary to State regulations, across a bare place on the power cable.

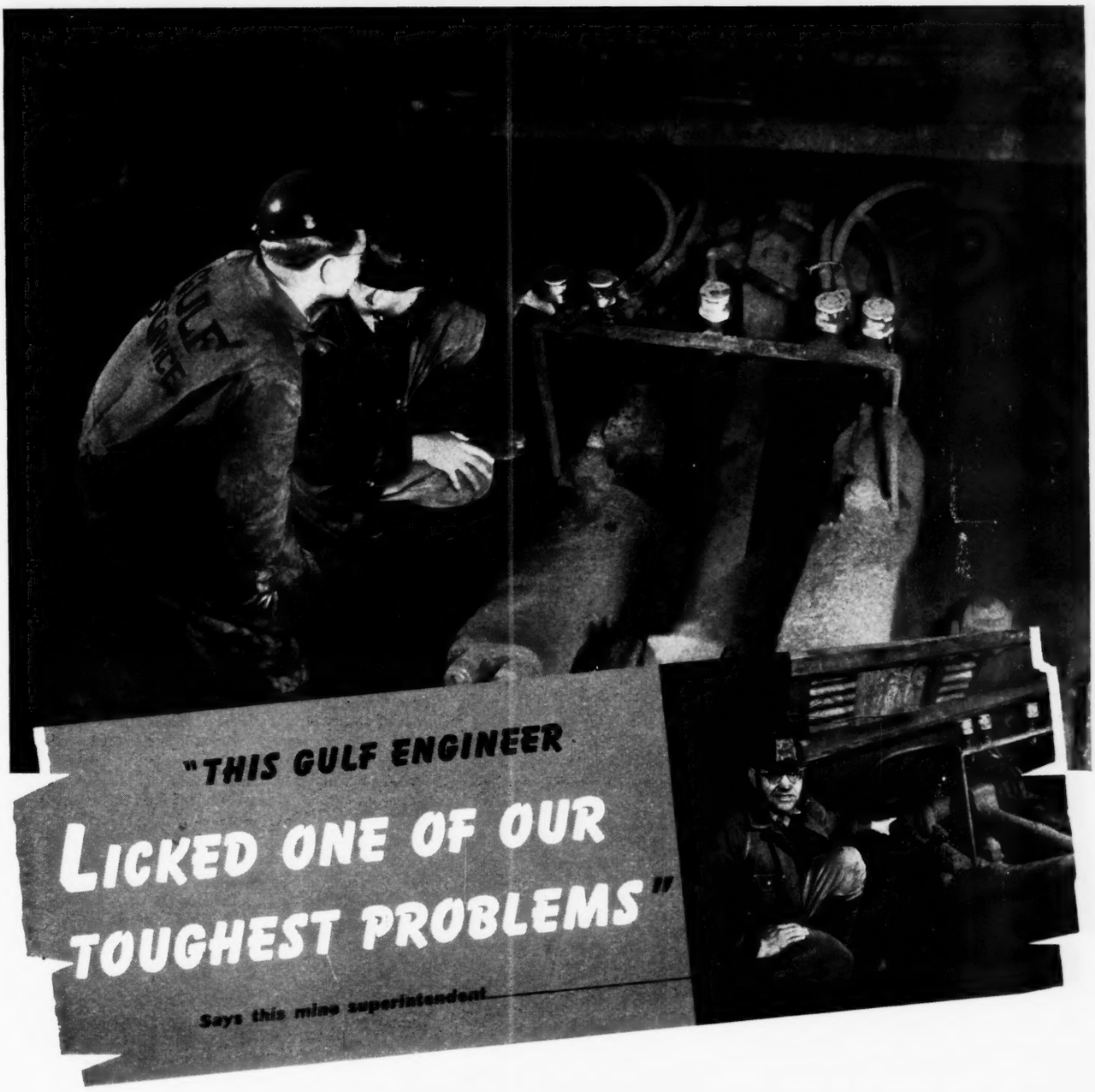
Six of the seven major explosions of this and last year were in mechanized mines, declared W. J. Fene, mining engineer, safety division, U. S. Bureau of Mines, Pittsburgh, Pa., in summation of the inspectors' reports. Mr. Fene repeated the recommendations of the Bureau in connection with the several explosions, as already published in *Coal Age*. This record, he added, is not necessarily an indictment of mechanization, as Illinois, Indiana and Wyoming, all highly mechanized States, have not experienced an explosion for several years.

Three Defense Lines

Operators have three lines of defense against methane explosions, declared R. D. Currie, General Reinsurance Corporation, Trucksville, Pa.: (1) lowering methane percentage; (2) eliminating sources of ignition; (3) having well-trained men, especially officials. Use of permissible equipment to do 90 per cent of the jobs in gassy mines and then provision of non-permissible devices to do the other 10 per cent is almost as ridiculous as allowing men to carry not more than one match into a gassy mine. Use of open-type electric drills or dynamite for blasting rock when cutting machines, loading machines, explosives, lamps and other equipment are of permissible type is common practice in many coal mines.

Newspapers and the general public, stated J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines, Annapolis, Md., pay much attention to mine disasters and the dereliction of mine owners and officials but say little about such disasters as were prevented by bravery and foresight. He gave two instances, one in No. 1 mine of the Consolidation Coal Co., at Midland, Md., and one at the Big Four mine in the Lower Pocahontas coal field, both of which mines were flooded, yet, by reason of quick or premonitory judgment and bravery, without the loss of a man.

In many cases, regretted Thomas Moses,



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former president, H. C. Frick Coke and associated companies, the mine inspector must be acceptable politically to the home representatives of the political organization in power in his State, often to his great embarrassment. Inspectors have had to take sides in industrial relations because of the political power of either party. Yet, mine inspectors desire to apply themselves solely to improving the safety and health of the men in the mines.

"Salaries have always been too low." State legislators have always felt that the position of the mine inspector was more or less political, and, as a surplus of men sought the position, the salary was adequate. Owners regarded the inspectorate as a place from which they could draw supervisors or in which they could place a man grown old in their service. Mine inspectors, when they reach a retiring age, should get a suitable pension, and changes in political control should not be occasion for dismissal.

During many years of service an excellent inspector had seen his salary raised from $1,200 to $1,800 a year. One day an ambitious young colleague started agitating for a general increase in inspectors' salaries, but the older man said he wanted no increase and advised the young man to resign and get a better job, adding that if his own salary were raised to $2,500 a year, the competition for his job would be more than he could meet. At Mr. Moses' suggestion a committee was appointed by the institute to present the need for higher salaries and pensions to the legislators of the several States and to frame suitable legislation.

Monthly Meetings Advocated

Formation of monthly safety meetings for all mining employees at every mine by the mining inspection department of Kentucky did little for safety, asserted A. D. Sisk, safety director, Big Sandy-Elkhorn Coal Operators' Association, Pineville, Ky. The next step taken was to form six regional institutes for discussing operating problems. This, with the newly reestablished Kentucky Mining Institute, has been extremely helpful and stimulating. The Mayo State Vocational School at Paintsville, Ky., with help of several operators, has inaugurated a mining mechanics' course for the sons of employees where electricity, machine-shop practice, welding and mechanical drawing are taught.

Coal mining in Virginia, declared C. P. Kelly, chief mine inspector, Department of Labor and Industry, Richmond, is confined principally to six southwestern counties employing some 18,000 miners. Through the trade and industrial division of the Department of Education a two-year course in practical coal mining with two full-time and two part-time instructors engaged in this work has been established. In 1940, diplomas were awarded to 173 miners, and at the present time 29 classes with 386 students are enrolled in this course.

"Cussing," declared William L. Neill, mine inspector, Division of Safety and Inspection, Birmingham, Ala., is not an inspector's best way to increase safety. Advice, and development of the safety spirit by institutional work is a surer way to reach the goal. A major problem in the anthracite mines is that presented by the great volume of water likely to follow from mine to mine until it reaches levels as much as 1,500 ft. below sea level in a country with the main streams about 500 ft. above the tide, declared S. H. Ash, district engineer, U. S. Bureau of Mines, Wilkes-Barre, Pa. (*Coal Age*, December, 1940, p. 110). He advocated driving of tunnels to prevent complete liquidation of the industry.

Speaking of the South African mines, H. F. Hastings, managing director, Mine Safety Appliances Co., Africa (Proprietary), Ltd., Johannesburg, S. A., said the fatality rate in the gold-mining industry had been reduced from 3.81 per 1,000 employees per annum in 1913 to 1.71 employees in the year past, despite illiteracy of natives and 100 per cent turnover. Yet the bituminous mines of this country, after deducting 276 fatalities for major dust and gas explosions, had a fatality rate of 2.14 employees per 1,000. As natives are susceptible to tuberculosis, pneumonia and septic infection, each is issued a heavy wool jacket to wear when entering or leaving the mines. The diet of the natives is rigidly prescribed by the government and they are said to be the most scientifically fed workmen in the world.

During one of the sessions, P. A. Grady, general superintendent, Carrs Fork Coal Co., Allock, Ky., was presented with a Certificate of Honor on behalf of the Joseph A. Holmes Safety Association as having during a five-year period produced 1,428,410 tons of coal with 1,867,202 man-hours of exposure without a fatality under very bad roof conditions. Mr. Grady, a charter member of the institute, became an inspector at 23 and remained an inspector for 5 years. He reduced the frequency rate at Carrs Fork from 63.62 in 1935 to 29.06 in 1940 and the accident severity rate from 9.53 to 0.93 in the same period. Lexington, Ky., will be the next year's meeting place.

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Varied Program Marks Boat Trip Meeting Of Illinois Mining Institute

SMOKE control, accidents, stripping equipment and legislation were feature subjects discussed at the 23d annual boat-trip meeting of the Illinois Mining Institute, which started from St. Louis. W. J. Jenkins, president, Consolidated Coal Co., presided at the opening session, June 7, and the afternoon session was conducted by J. A. Jefferis, Illinois Terminal R. R. System, with a capacity attendance of members and guests aboard the Steamer "Golden Eagle."

In welcoming the gathering, Dr. M. M. Leighton, president of the institute and director of the Illinois State Geological Survey, emphasized that "coal is fundamental," adding that it is permanent, while oil is not. The coal industry, he warned, should encourage the conservation of oil as one of the aids to its own salvation. In this connection, he declared that the present oil legislative program should be the concern of the coal industry. He expressed anxiety about the present position of coal in the economic set-up of Illinois.

Dr. M. M. Leighton
Institute president welcomes members and guests.

Tracing smoke control in St. Louis, R. R. Tucker, Commissioner of Smoke Regulation in the Mound City, declared that for 75 years or more the city has gone through the motions of passing an ordinance and appointing a Smoke Committee. With that it stopped. Then another smoke pall appeared, and the procedure was repeated.

In 1937, the municipal authorities appointed a consultant. But his report was like the old ones, which did not please some of the people. True, controlling the coal that could be used produced some results—it reduced sulphur and fly ash. But the public was not satisfied; it was only a foundation on which to build. It was decided that smoke could not be abated without controlling the equipment as well as the fuel.

Smoke in industry, said the speaker, had dropped from 13 to 1 per cent. He believed that residential districts produced half the smoke. The city had instituted an educational campaign back in 1925-28, when instruction was given in hand-firing smoke-producing coal. But that did not prove effective, since people will not give the attention required to reduce smoke density to a satisfactory point. Mr. Tucker set the permissible limit of smoke for any one hour at 6 minutes of No. 3 density or 9 minutes of No. 2 density, but even that limit is not permissible for all hours. A sequence of hours of smoke emission at these densities is not permitted.

Citing the winter of 1940-41 as normal for St. Louis, Commissioner Tucker said satisfactory progress in smoke prevention had been made. "Ask the day worker if there has been smoke," he suggested; the public wants a visual demonstration. He attributed this progress largely to the use for fuel of a million tons of smokeless coal. Disclaiming antagonism to Illinois coal, he insisted St. Louis would like to buy more Illinois coal. But, he insisted, St. Louisians should get what they specify.

The St. Louis ordinance, the speaker

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pointed out, specifies that processed or other fuel for hand-firing must contain less than 23 per cent of volatile matter. But if another fuel meets the same smokeless requirements, it may be used. All the producer of the latter fuel need do is demonstrate its qualifications before Mr. Tucker to obtain approval. Already, he said, one Illinois product has been approved. The burning characteristics of this product—briquets—have been so changed by compacting the fine coal used in its manufacture that, according to the city standards, it is acceptable. "All St. Louis wants," declared Mr. Tucker, "is a fuel that meets smokeless requirements."

The St. Louis campaign has attracted widespread attention—letters of inquiry have been received by Mr. Tucker from 100 cities, 31 States, and from Canada and Puerto Rico. Four other cities are actively engaged in similar projects, he said, but have not succeeded in getting favorable action.

The campaign for smoke elimination has done more to stimulate research than all other agencies, the speaker insisted, and it will be pushed further to promote a broader and more stable market. Hand-firing, he said, is out; equipment must be improved as well as fuel. The human element must be eliminated; heating equipment must be fired mechanically. The stoker, he commented, is smokeless because it feeds small increments of coal into a highly oxygenized atmosphere.

Discussion brought up the question "What is processed fuel?" — particularly with reference to applying liquid preparations to alleviate dust. Broadly, Mr. Tucker's definition is: "Any fuel subjected to mechanical, chemical or heat treatment that reduces volatile content or produces burning characteristics that are smokeless."

Data on mines, production and accidents in Illinois were presented by Robert M. Medill, director of the State Department of Mines and Minerals. Though this is the second term for Mr. Medill, he gave credit for the results achieved to his immediate predecessor, James McSherry.

Statistics Revealing

In 1940, said Mr. Medill, there were seven fewer shipping mines and 66 fewer local mines than in 1939. There were 38,013 men employed in 1940, compared to an average of about 45,000 for the four-year period 1936-39. Coal produced last year by 139 shipping mines totaled 46,713,000 tons; while 764 local mines yielded a tonnage of 5,158,694, or a total of 51,871,904 tons for the 903 mines. In the preceding year, 146 shipping mines produced 42,944,107 tons, while 830 local mines had an output of 4,633,347 tons, or a total for the 976 mines of 47,577,454 tons. Of this tonnage, strip mines accounted for 14,135,077 tons in 1940 against 12,285,077 tons in 1939. A total of 903 mining machines were in service in 1940, compared with an average of 1,171 for the years 1936-39; loading machines, 761 and 1,260, respectively (the striking reduction in the latter instance probably being due to the abandonment of hand-loading conveyors). It is notable that these figures indicate that Illinois is producing more coal with fewer mines, men and machines.

The fatal accident record of Illinois for 1940 showed a total of 83 victims; shipping mines accounted for 71, of which strip mines had 5, and local mines had 12. Distribution of fatalities was as follows: falls accounted for, 45; explosives and gas, 2; electrocution, 2; tramming machines, 4; L. O. X., 2; slide of side wall, 1; fall from dragline cab, 1; fall into greasing pit, 1.

On a tonnage basis, fatalities were as follows: total production, one fatality per 625,000 tons; shipping mines, one fatality per 657,930 tons; local mines, one fatality per 429,890 tons; deep mines, one fatality per 525,733 tons; strip mines, one fatality per 2,827,015 tons. By territories the range was from one fatality per 166,560 tons in Saline County to one per 1,025,750 tons in Franklin County.

Electrical accidents, said Mr. Medill, seem to be increasing both above and below ground. The best approach to accident prevention, in his estimation, is through management and men; the recently enacted Federal inspection law, he thought, would have little effect on his department. Inquiry by a representative of the Pittsburgh Coal Co. as to spraying water at the face to alleviate dust brought the response that little of it is done in Illinois.

Once an outlaw but now occupying a legitimate place in coal production, strip mining, said R. K. Bixby, general superintendent, Midland Electric Coal Corporation, is witnessing a steady evolution to lower unit cost through improved stripping equipment. Early strip operations, he said, were

started near the outcrop where cover was thin and easily handled. Shovels, wheelbarrows and hand labor made up the equipment, followed by teams and scrapers. About 1910 stripping with mechanical power began.

The first successful mechanized stripping shovels were mounted on rail trucks, carried a 3½-yd. dipper and weighed about 150 tons. After 30 years of evolution we have huge machines with 30- to 35-yd. dippers and weighing 1,550 tons. Electricity has been substituted for steam, Ward Leonard control for resistor control, crawlers for rail trucks, and a steady increase in weight. Alloy steels have made possible greatly increased dipper capacities at reduced weight; also many improvements have been added for convenience, speed and reliability.

Further improvements to be expected, according to Mr. Bixby, will be directed toward even greater reliability in operation, more comfort for the operator and ability to uncover greater depth of overburden. This will mean more ball and roller bearings, a central lubricating system, fluid drive and faster cycles—which will require more power. With heavier equipment will come electric hoists for use in assembly and repair work, for heavier parts may mean that repair work will be a bit more difficult. Protection from the discomforts of both summer and winter weather may even bring air conditioning in the operator's cab.

A new device to bring about quicker response to the motors which power the shovel movement is now being tested—the amplidine, which is a device attached to the exciter to facilitate acceleration. Crowd motors will no longer be mounted on the boom but on the deck or on top of the "A" frame of all large shovels.

Overburden Ratio Increasing

The ratio of overburden is increasing in the great stripping areas of Illinois, Kansas, Missouri and Oklahoma, but in the future even greater overburden must be handled. Hence dippers will be larger, as also will booms—to take care of the greater range necessary. Machines will be heavier and there will be more power; studies are now being made on equipment for 40- or 50-yd. shovels, and when the occasion arises they will be built.

A comparatively new machine, the walking dragline, with a capacity for long range and deep overburden, Mr. Bixby pointed out, is being groomed for a new job. Designed for levee work, with 12- or 13-yd. buckets and 225-ft. booms, it is being prepared for coal stripping. Larger and having more power, higher speed and a new dragline mechanism, it will meet new problems. The speaker foresaw a combination of a large shovel with big walking dragline as a team for local stripping in the future.

In response to a query as to how much overburden might be profitably moved, Mr. Bixby said too many conditions must be considered to give an offhand answer, but from an engineering point of view he considered 75 or 80 ft. within the range of possibility.

The coal operator's troubles began with ventilation and haulage, then machines were added, and now legislation has become one of his major worries, declared D. D. Wilcox in his approach to the subject "Legislation Affecting Illinois Coal Mines." Whether they know it or not, he added, coal operators are in politics. Among the reasons for legislation concerning the coal industry are the acts or the negligence of the operators themselves. To a certain degree the operator also is responsible for laws he has not undertaken to prevent; he has failed to make known his needs to our legislative bodies or to educate his own representative in the Legislature or in the Congress. Pressure groups who follow up their initial efforts are the ones who get results.

One of the chief concerns of the operator now is how to adjust his operations to the law. Responsibility for the Guffey act is laid at the feet of the industry because it failed to clean house. Yet, declared Mr. Wilcox, it is not so much the law as its execution that harasses the industry. Already organized and bargaining collectively, the mining industry complacently thought legislators aimed at placing other industries on a footing with it;

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons May 1 1941	P.C. Change From April 1 1941	P.C. Change From May 1 1940
Electric power utilities	9,540	−15.79	+ 0.38
Byproduct coke ovens	4,970	−49.56	− 3.49
Steel and rolling mills	723	−43.33	+28.32
Railroads (Class 1)	5,714	−34.63	−43.20
Other industrials*	11,560	−19.66	+ 7.37
Total	32,507	−28.69	+ 6.56

* Includes beehive ovens, coal-gas retorts and cement mills.

Bituminous Coal Consumption

	Thousands Net Tons April 1941	P.C. Change From March 1941	P.C. Change From April 1940
Electric power utilities	4,247	−10.19	+19.26
Byproduct coke ovens	6,404	−10.52	+13.71
Steel and rolling mills	947	− 7.52	+30.63
Railroads (Class 1)	6,833	−20.55	+ 1.66
Other industrials*	10,575	−15.61	+12.11
Total	29,006	−14.79	+11.25

Coal Production

Bituminous

Month of May, 1941, net tons	43,400,000
Per cent inc. over May, 1940	24.37
January-May, 1941, net tons	183,186,000
Per cent. dec. from Jan.-May, 1940	2.16

Anthracite

Month of May, 1941, net tons	3,858,000
Per cent dec. from May, 1940	2.50
January-May, 1941, net tons	21,060,000
Per cent inc. over Jan.-May, 1940	2.01

Sales of Domestic Coal Stokers Vs. Oil Burners

Sales	Coal Stokers	Oil Burners
April, 1941	9,917	16,216
P.c. inc. over April, 1940	52.80	48.14
January-April, 1941	28,907	49,917
P.c. inc. over Jan.-Apr., 1940	56.41	29.48

Index of Business Activity*

Latest week	149.2
Per cent change from month ago	+ 4.63
Per cent change from year ago	+25.38

* *Business Week*, June 14.

Electrical Power Output†

Week ended June 7, kw.-hr.	3,042,128,000
Per cent change from month ago	+ 2.25
Per cent change from year ago	+17.1

† Edison Electric Institute.

but, said Mr. Wilcox, coal men have been disillusioned. He called attention to the fact that agriculture, with a vastly greater numbers of workers, is specifically excluded from harassing control; also that the expense of unemployment and other benefits are imposed on the coal industry, while others escape.

Referring to other legislation already passed or in prospect, Mr. Wilcox said, in part:

The Federal mine inspection act will not decrease accidents. The Bureau of Mines has done good work; rather than more inspection a better equipped and better financed Bureau would have been of greater service. The Bureau lacked resources of funds and men.

Priorities enforced will make compulsory the better use of what we have. Machines may have to operate two or even more shifts a day; more attention must be given to maintenance, to the end that greater availability may be achieved.

The St. Lawrence waterway—what benefit will it achieve?

Will the laws relating to stream pollution help the people? Mr. Wilcox considers it a passing of the buck to industry to accomplish something the authorities themselves have been unable to solve.

Sees Taxes a Benefit

As to the all-important and rapidly growing tax problem, we should pay our taxes with gratitude because they are for the protection and benefit of all of us. But we should see to it that the things for which we are taxed are done.

We are due to have more laws. Intended as a benefit to men, they will penalize some mines. Oil wells come in for their share of legislation, but coal men should see to it that their coal seams are protected from the evils of encroachment. A man, of course, cannot be kept from the use of his property, but he can be made to pay for the damage caused in reaching it.

Coal men have been good boys; apparently too good, from Mr. Wilcox's viewpoint; so, now that their interests seem to run counter to those of others, they are made the goats.

What shall we do?

Any legislation is a limitation on someone. Coal men do not have enough to say about the laws that are passed. Mining men, rather than the law, reduce accidents. If they do not inform their lawmakers about the needs and difficulties of the industry, coal men do not show the proper interest; mining men do not preserve a united front.

Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in May, as follows:

Goodman Manufacturing Co.—Type 91-D-15 chain conveyor; 5-hp. motor, 230 volts, d.c.; Approval 428; May 7.

Jeffrey Manufacturing Co.—Type 35-L-20 shortwall mining machine; 20-hp. motor, 250 and 500 volts, d.c.; approvals 429 and 429A; May 15.

Goodman Manufacturing Co.—Type 260-BL loader; four motors, 50, 4, 1½ and 1½ hp., 250 volts, d.c.; Approval 430; May 19.

A violation of safety rules is unfair practice. Good safety records are common with some mines. The education of mine managers as a safety measure should apply to small as well as to large mines. Research—under the Mines and Minerals Department—in accident prevention is one of the means to increase safety in mining. Investigation of roof falls is pertinent.

Calling attention to expenditures for the protection of fish and miners, Mr. Wilcox imparted the astounding information that fish received the greater share. Referring to qualifications for coal-mine inspectors, he declared "qualified miners are better than unqualified anybody."

Commenting on the Illinois Mining Commission, the speaker said both the operators and miners have agreed not to back any legislation that does not receive the approval of that body. In closing, Mr. Wilcox made the terse comment: mining is more than a mere means of living.

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A.I.M.E. Names McAuliffe Next Year's President

Nominations for officers of the American Institute of Mining and Metallurgical Engineers were presented to the board of directors at their meeting, June 19, in New York, and accepted by them for placement on the ballot. Those named were Eugene McAuliffe, president, Union Pacific Coal Co., Omaha, Neb., for president; L. E. Young, consulting engineer, Pittsburgh, Pa., and Chester A. Fulton, president, Southern Phosphate Corporation, Baltimore, Md., for vice presidents.

For directors the following were named: Carroll A. Garner, vice president, Jeddo-Highland Coal Co., Jeddo, Pa.; Wilber Judson, New York; Charles Camsell, deputy minister, Department of Mines and Resources, Ottawa, Canada.; Francis A. Thomson, president, Montana School of Mines, Butte, Mont.; and William B. Heroy, president, Pilgrim Exploration Co., Houston, Texas. To these the directors under the bylaws added Leo F. Reinmartz, manager, American Rolling Mill Co., Middletown, Ohio. Messrs. Young, Fulton, Garner, Camsell and Thomson succeed themselves.

Nominations were presented also for the several divisions. In the Coal Division, Newell G. Alford, mining engineer, Eavenson, Alford & Auchmuty, Pittsburgh, Pa., was named for chairman; Cadwallader Evans Jr., vice president, Hudson Coal Co., Scranton, Pa., for vice chairman. Executive committeemen for three years included: A. W. Gauger, director, Mineral Industries Research, Pennsylvania State College, State College, Pa.; Raymond Mancha, manager, ventilation division, Jeffrey Manufacturing Co., Columbus, Ohio, and T. R. Workman, consulting engineer, West Virginia Coal & Coke Corporation, Omar, W. Va.

Under the bylaws "any complete or partial ticket of nominees signed by any 25 members or associates of the institute and transmitted to the secretary by Aug. 15 shall also be printed and circulated with the official ballot," etc., but the board, to save expense, has under advisement making a ballot unnecessary unless such nomination or nominations are presented by that date.

Annual Eastern Ohio Meeting Attracts 250 Coal Men

With over 250 members and guests in attendance, the Eastern Ohio Coal Mining Institute held its annual meeting June 21 at the Elks Club, Bellaire, Ohio. The organization is headed by Jerome Watson, safety director, Willow Grove No. 10 mine, Hanna Coal Co. of Ohio, with other officers as follows: vice chairmen, Leo Harris, motor boss, No. 4 mine, Rail & River Coal Co., and H. D. Jack, electrical engineer, Wheeling Township Coal Mining Co.; treasurer, E. J. Christy, chief engineer, Wheeling Township Coal Mining Co.; and secretary, R. D. Squibb, Youghiogheny & Ohio Coal Co.

With Mr. Watson presiding, a number of short addresses were made by members and guests, including brief discussions of the new Ohio mine law and federal inspection by Marcus Kerr, chief, division of mines, and George A. Strain, director, Ohio Department of Industrial Relations; John R. Crunelle, member of the Ohio Assembly from Belmont County; C. J. Albasin, commissioner, Eastern Ohio Coal Operators' Association; William Roy, formerly safety director for the Hanna Coal Co. of Ohio; Lot H. Jenkins, retired deputy mine inspector for Ohio; and G. W. Grove, district engineer, U. S. Bureau of Mines, Pittsburgh.

Arrangements for the meeting were handled by a committee composed of Laird Albasin, Youghiogheny & Ohio Coal Co.; Mr. Harris; Richard McGee and Al Nardo, deputy inspectors; and Joe Hora, section foreman, No. 4 mine, Rail & River Coal Co.

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Stoker Industry Flourishing; Makers Support Defense

Full support to the national defense and emergency program was pledged by leading stoker manufacturers from all parts of the country gathered at White Sulphur Springs, W. Va., May 26 and 27 for the 24th annual meeting of the Stoker Manufacturers Association. The stoker men agreed to devote not only as much plant capacity, manpower and material as possible for defense production but to increase stoker production to almost any extent required for heat, steam and power to meet the rapidly expanding demand from industry and government in both defense and non-defense projects.

Meeting with representatives of allied industries of raw materials used in stoker manufacturing, the stoker manufacturers discussed the effect of priority materials shortage, and the labor problem on stoker manufacturing and production in relation to the present sales and merchandising problems. "What's Ahead for Stokers" was the convention theme, one of the features being a "Stoker Sales

Among those at the speakers' table were (left to right): Marcus Kerr, George A. Strain, G. W. Grove, Lot H. Jenkins, William Roy, C. J. Albasin and John R. Crunnelle.

Posed for the Coal Age camera are Jerome Watson, chairman; Leo Harris and H. D. Jack, vice chairmen; R. D. Squibb, secretary; and Laird Albasin, Richard McGee, Al Nardo and Joe Hora, members, with Mr. Harris, of the committee on arrangements.

Information. Please." Six prominent sales managers covered practically every phase of stoker sales problems in connection with new conditions being created as a result of the national defense program.

With stoker sales for the first five months of this year about 70 per cent ahead of the corresponding period of last year, members of the association foresaw a record-breaking sales year, unless priority and other defense requirements or emergency conditions interfere to a great extent with the plans and sales programs of the manufacturers. It was the unanimous feeling, nevertheless, that the stoker industry has a brilliant future and that constant improvements in design and construction will eventually place the sales and installation of automatic coal-burning equipment ahead of competitive heating equipment.

Frank Hoke, vice president, Holcombe & Hoke Mfg. Co., was reelected president. Also reelected were: B. O. Fink, president, Auburn Foundry, Inc., as vice president, and J. M. McClintock, manager, stoker division, Illinois Iron & Bolt Co., as treasurer. Marc G. Bluth was reappointed secretary.

Attendance at the convention totaled about 75, and it was declared to be the most successful in the association's history. Plans were started for the fall meeting of the association, to be held in either Chicago or Indianapolis, at which time further study will be made of the defense situation as related to stoker manufacturing. President Hoke announced that chairmen and members of standing committees for the ensuing year would be appointed soon.

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Koppers Recreation Camp To Welcome 600

A new 76-acre recreation camp for children of mine employees of the Koppers Coal Co. has reached completion on its site on the inner curve of the Big Bend of the Greenbrier River 10 miles east of Hinton, W. Va. Eleven camp cottages, a dining hall, an infirmary, an office cottage and a cottage for domestic help were all in readiness for the initial group of youngsters to arrive on June 28 for the first of four two-week camping periods of the 1941 summer season.

The project has been named Camp Thomas E. Lightfoot in honor of the company's director of welfare, who is responsible for its creation. It is owned by Koppers Recreation Camps, Inc., chartered by the State of West Virginia as a non-profit organization.

The site of the camp buildings is on a plateau 90 ft. above the low-water level of the river. There is an 1,800-ft. frontage of wooded slope on the river with two large swimming beaches.

With a capacity of 150 for each two-weeks period, it is expected that 600 youngsters between the ages of 8 and 15 will use the camp during July and August. The children pay a small fee, but the bulk of the cost of operating the camp is paid by Koppers. This will be the sixth season of Koppers summer recreation camps. Previously they have been conducted on camp grounds rented from 4H clubs and scout troops in various sections of West Virginia.

The new camp is under the direction of Max (Hippo) Poscover, principal of Durbin (W. Va.) public schools and a well-known West Virginia basketball and football player. He will be assisted by six men and six women counselors, two boy and two girl junior counselors, and two full-blooded Indians who will teach Indian lore and crafts.

A camp for the children of colored employees at Koppers mines will be conducted at Wyndall, four miles from Gauley Bridge along the Gauley River, where a similar recreational program will be carried out.

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Personal Notes

JESSE G. BOWERS, formerly a machine operator at mine No. 93 of the Consolidation Coal Co., Jordan, W. Va., has been named section foreman at No. 97 mine of the same company, Rivesville, W. Va.

W. P. BUFFINGTON has been named traffic manager of the Rochester & Pittsburgh Coal Co., with headquarters at Indiana, Pa. Until this change he was traffic manager for the Pittsburgh Coal Co.

WILLIAM J. BURNETT JR., formerly division electrical engineer for the Peabody Coal Co. at Marion, Ill., has been transferred to the Northern Division, comprising the mines at Springfield and Taylorville, Ill., with similar duties.

DENVER CUTRIGHT has been appointed section foreman at Golden Ridge No. 6 mine of the Minds Coal Mining Corporation, Elkins, W. Va.

LIEUT. COL. CARLTON S. DARGUSCH, vice president and general counsel, Sunday Creek Coal Co., Columbus, Ohio, has been appointed Assistant Deputy Director of Selec-

Koppers recreation camp dining hall.

ive Service, with headquarters at Washington. In this capacity he will serve on the executive council which will pass on all matters of policy pertaining to the selective service system.

WILLIAM H. DAVIS, New York patent attorney and vice chairman of the National Defense Mediation Board, has been named chairman of the latter body by President Roosevelt. He succeeds Clarence A. Dykstra, who resigned to return to his post as president of the University of Wisconsin. Mr. Davis, who is a former chairman of the New York Mediation Board, headed the panel in settling the Appalachian bituminous wage argument.

ALAN C. DODSON, president of Weston Dodson & Co., has been elected vice president of the Independent Anthracite Operators' Association, succeeding Byron W. Sleppy, who resigned to go into another line of business.

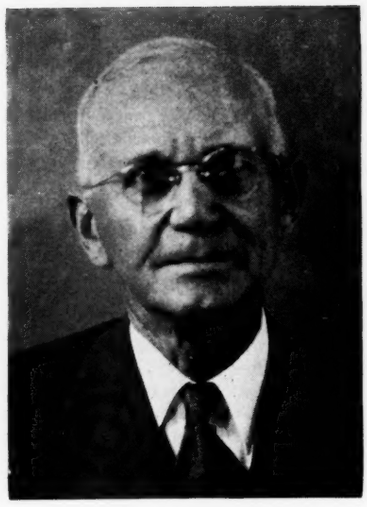
ROBERT GORDON, Urbana, has been appointed by Governor Dwight H. Green as Assistant Director of Labor of Illinois, succeeding A. L. McInerney, Chicago, who resigned. The new appointee is widely known in State labor circles, having held many labor offices and represented many labor organizations in legislative matters.

LUTHER HARR, City Treasurer of Philadelphia, has been nominated by President Roosevelt for Consumers' Counsel under the Bituminous Coal Stabilization Act. The nomination, which was backed by Senator Guffey of Pennsylvania, was referred by the Senate to the Interstate Commerce Committee, which voted a favorable report on June 4. Mr. Harr was State Secretary of Banking under Governor Earle of Pennslyvania.

GEORGE H. HORNICKEL, for the last 28 years general superintendent for the Anchor Coal Co., Highcoal, W. Va., has retired. He began work in the tipple at the Monon mine, Monogahela, Pa., 50 years ago at the age of 21. Shortly thereafter he entered the Jeffrey Mfg. Co. plant at Columbus, Ohio, to take a practical course in electricity. On its completion he returned to the Monon mine as an electrician. His first position as superintendent was in 1898 for the M. A. Hanna Coal Co. at Dillonvale, Ohio; later serving ten years as general superintendent of the Hanna company's Massillon division. Beginning in 1911 he spent two years in British Columbia prospecting coal lands, and then began his connection with the Anchor Coal Co.

H. K. KUGEL, chief engineer of the Division of Smoke Regulation and Boiler Inspection, Washington, D. C., was named president of the Smoke Prevention Association of America at its 35th convention, in Atlanta, Ga. W. E. E. KOEPLER, secretary of the Pocahontas Operators' Association, is first vice president, and FRANK CHAMBERS, chief smoke inspector, Chicago, is secretary-treasurer.

C. R. LARRABEE, special assistant to Director Howard A. Gray of the Bituminous Coal Division, has been designated as acting chief of the trial examiners' section. He replaces Thurlow G. Lewis, who resigned to resume the practice of law at Benton, Ill. Mr. Larrabee joined the Division on July 1, 1939.



George H. Hornickel

DR. M. M. LEIGHTON, chief of the Illinois State Geological Survey, has acceded to a request to serve on the newly created advisory committee on metals and minerals established by the Office of Production Management in Washington, D. C. Clyde Williams, director of Battelle Memorial Institute, Columbus, Ohio, is chairman of the committee.

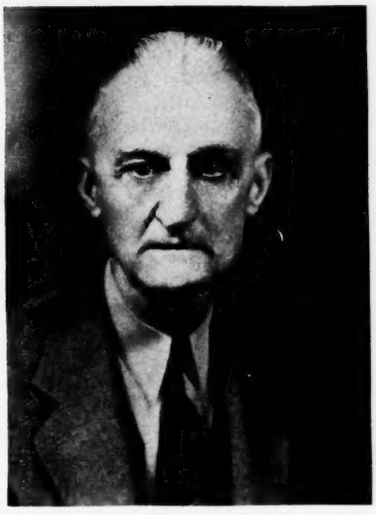
EDWARD T. MCCORMICK, who has been adviser to Miss Elliott on priorities, has been named head of the Fuels Division for the Civilian Supply Allocation Division of the Office of Price Administration and Civilian Supply. He was for six years financial analyst for the Securities and Exchange Commission, holds a Ph.D. degree from Duke University and is a certified public accountant.

FARRELL PAGE, of the Bell & Zoller Coal & Mining Co., Zeigler, Ill., has accepted a position as salesman for B. E. Schonthal & Co., Chicago.

WILLIAM SCOTT, of Columbus, Ohio, has been made traffic manager of the Lorado Coal Mining Co., which operates mines in Logan County, West Virginia.

QUINN SHAUGHNESSY has been appointed price executive for the Fuel Section of the Office of Price Administration and Civilian Supply. He is on leave of absence from the Securities and Exchange Commission, where he was assistant director of registration in charge of new financing. He entered the government service in 1932 as a lawyer in the Reconstruction Finance Corporation, and served successively with the Treasury and the Petroleum Administrative Board.

FRANCIS M. SHORE, for many years an authority on the economics of the coal industry, has been appointed chief economist, Coal Economics Division, U. S. Bureau of Mines. He became executive assistant to the Federal Fuel Distributor in 1922; was



Francis M. Shore

appointed assistant chief of the Coal Division of the Bureau of Foreign and Domestic Commerce in 1923, and when that work was transferred to the Bureau of Mines in 1926 he continued to serve in a similar capacity until 1937, when he became assistant to the chief of the Economics and Statistics Branch, Bureau of Mines.

FREDERICK W. SLACK has been named district manager of the Philadelphia office of a Priorities Division field organization set up by E. R. Stettinius, Jr., Director of Priorities, Office of Production Management. Mr. Slack has been associated with W. A. Marshall & Co., Johnstown (Pa.) coal firm, and with the sales department of the Sitnek Fuel Co., Philadelphia. He formed the Slack Coal Co. in 1926.

VAN B. STITH, formerly superintendent of mines for the Anchor Coal Co., Highcoal, W. Va., has been made general superintendent, vice G. H. Hornickel, retired.

ROBERT A. WILLIAMS has resigned as mine superintendent at Delcarbon No. 2 mine of the Calumet Fuel Co., Delcarbon, Colo., a position he had held since 1914. He was given a farewell party by fellow employees on June 4.

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Wage-Hour Ruling Revised

A revision of Interpretative Bulletin No. 6, providing that the 40-hour week and 30c. minimum do not apply where sales are 75 per cent retail has been issued by the Wage-Hour Division, U. S. Department of Labor.

Included in the findings is a section dealing with company cafeterias or stores, bunkhouses, and cookhouses. It was found that generally the exemption applies in cases where the goods or services are sold for cash to the employees and the store is normally open to the general consuming public. In other words, "a physically separated place of business may be considered as a retail or service establishment separate and distinct from the non-retail plant of the employer."

In regard to cookhouses and bunkhouses, the Division found that such places operated at lumber or mining camps were part of the business of the company in furnishing services to its employees. It was found that "cookhouses and bunkhouses may not be considered as separate retail or service establishments for purposes of exemption. Similarly, employees working on a traveling commissary or camp car which goes along with the working construction crew on a railroad or telegraph right-of-way are not engaged in a retail or service establishment for purposes of exemption. No distinction can be drawn between the employee who sharpens the tools for the men in the gang and the employee who cooks their meals, washes their dishes, or makes their beds."

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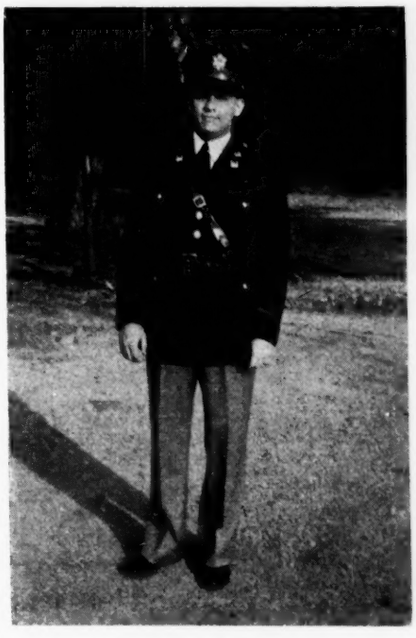
In the Army Now

Charles H. Lambur Jr., assistant editor of *Coal Age* for the last two years, has been inducted into the United States Army, which he joined at Fort Belvoir, Va., on June 15. Born in St. Louis, Mo., in 1910, Mr. Lambur was graduated from the mining department of the Missouri School of Mines and Metallurgy in 1933 with a B.S. degree.

Soon after graduation he prepared a mineralogical report on properties controlled by a California oil company, after which he returned to Missouri as a project engineer with the State Highway Department. In 1934 he resigned to join the staff of the mining engineering department of the Philadelphia & Reading Coal & Iron Co. Later he organized a partnership for the exploration and development of quicksilver properties in Texas. Returning to the coal industry, he became affiliated with the engineering department of the Sahara Coal Co. in the development of its new stripping and slope mines in the southern Illinois field, joining *Coal Age* Aug. 1, 1939.

At Fort Belvoir, Mr. Lambur, who is a first lieutenant in the Reserve Officers' Engineering Corps, will receive intensive training to prepare him for a captaincy.



Charles H. Lambur Jr.

West Virginia Mining Institute at Huntington Turns Attention to Sales Relations

RELATIONS of sales and production departments were spotlighted by three of the five papers presented at the summer meeting of the West Virginia Mining Institute, held June 20 and 21 at the Pritchard Hotel, Huntington. Other subjects covered were safety and modernization. W. G. Crichton, Charleston, president of the institute and vice president of the Johnstown Coal & Coke Co., presided at the first technical session, and Max Forester, vice president of the institute and assistant general manager of operations of the Consolidation Coal Co., was in the chair during the second.

An engraved certificate of life membership in the institute was presented at the banquet to Charles E. Lawall, president of West Virginia University. During the years that he was head of the mining engineering department of that school he served the institute as secretary-treasurer and later was president. "Research," said Dr. Lawall, speaking at the banquet, "holds the destiny of the industry in its hands." He conceded that to stay in business a mining man must be practical, but warned that the operator won't be able to meet competition unless that practicability is supplemented by a keen interest in scientific development.

"The customer," said C. R. Mabley Jr., assistant to the vice president, Island Creek Coal Sales Co., reading his paper, "What Should the Production Department Do to Make Sales Effective," "has come to expect standards to be maintained even in the bituminous coal industry and he is going to buy from those producers who can offer coal of the desired quality and maintain that standard day in and day out."

The foremost duty of a sales department was defined as obtaining the highest possible realization for the product and to have sufficient orders on hand to insure uninterrupted operation at a high rate. The production department's job is turning out the most merchantable product with maximum uniformity and at the lowest cost consistent therewith.

Truly representative sampling for determinations leading to maintenance of uniformity in chemical and physical characteristics, Mr. Mabley outlined as the first way in which the production department can assist sales. Correcting deficiencies before waiting for the sales department to put up a "holler" is the second. "Take the sales department into their confidence" was his third hint to the producers, and this, he said, implies reciprocal confidence whereby the sales head should keep the production executive informed as to trends affecting volume and realization.

J. Lindley discusses safety and D. L. McElroy, secretary-treasurer, jots down a few notes.

At the banquet table Charles E. Lawall accepts a life membership. Bowl of live goldfish and baby bottle in front of W. G. Crichton were not his fare but were left by a magician who performed prior to Dr. Lawall's address.

Mr. Mabley cited examples wherein wholehearted cooperation and respect between sales and production departments may avoid confusion and dissatisfaction. Knowledge imparted to the sales department of a changed mining condition pointing to the possibility of a lower ash fusion temperature allows the sales department to attempt placing the coal in plants with slag tap furnaces where low fusion is an advantage. Also, instead of blaming customer complaints on the production department, investigation might prove the difficulty to be due to a lower standard of maintenance of the customer's own equipment.

Presidents of coal companies should not allow any salesman to sell coal below a set minimum figure, though "the sales managers are nearly as bad," was the essence of a letter from Samuel Pursglove Sr., vice president in charge of operation, Pursglove Coal Mining Co., sent in lieu of his scheduled paper "The Production Man's View of Coal Selling." In this letter, read by Mr. Crichton, Mr. Pursglove deplored the lack of knowledge of younger salesmen, adding that a coal salesman should know all of the items contributing to the actual cost of production, including royalties paid, and should be informed as to the percentages of fines.

"Preparation perfection, as nearly as that can be accomplished, on every shipment which leaves the mines" is the expectation of the sales department, and its reason "because it must make new customers and keep the old ones, to the end that the mine will enjoy the best operating time and therefore the most favorable costs," was the theme of a paper prepared by Elmer Wierhake, vice president, Smokeless Fuel Co., Charleston, and read by Mr. Crichton in the absence of the author. The paper emphasized the necessity of a system of inspection which will provide the sales department with notification of an inferior car of coal early enough so that the car can be placed where the variation will make the least difference.

"The sales department should never oversell," continued Mr. Wierhake's paper, "because then the sale begins with a handicap. and no matter what cooperation the mines have afforded as regards preparation, the customer is likely to be dissatisfied." Under the present highly competitive conditions, with inroads of substitute fuels, "every man who has any part in the preparation of coal should feel that he is an important cog in the operation of the mine, and in fact an important cog in the sales staff."

In discussion, Mr. Mabley stated that inspectors at Island Creek mines are under the operating department, but that the sales executive gets copies of all analyses. He admits that standards of coal quality for a limited district are possible, but for a large section or producing area the upper and lower limits would be so wide that the standard would be ineffective. He mentioned that more than one company has with great success put young engineers in the operating department for training for sales jobs. He recommended that salesmen be brought to the mine once a year for a broadening of viewpoint in relation to operating problems.

C. R. Mabley Jr. caught at a point of emphasis.

H. D. Smith, assistant to the president, Buckeye Coal & Coke Co., omitted indictments of both sales and operating departments, saying that he has been in both and usually his sympathies "turn 100 per cent" after he gains the other side's viewpoint.

That the coal inspection department should be entirely separate from both operating and sales departments and should report directly to the president was the opinion expressed by George E. Keller, Commercial Testing & Engineering Co., Charleston. Sampling methods he places as the most important factor in quality con-

Still discussing coal. Left to right: D. A. Marshall, of Phillips Mine & Mill Supply Co.; Joseph Pursglove Jr. and Max Forester.

trol. As to standards of coal for a district, he cited the instance of failure of a committee to set a standard for egg coal for bituminous east of the Mississippi because no decision could be reached as to what constituted an impurity.

That coal companies are deficient in trained men, have not expanded the supervisory force proportional to the increasing demand for closer control, and expect "supermen" was voiced by Joseph Pursglove Jr., general manager, Pursglove Coal Mining Co. To simplify operation and prevent errors in preparing and billing coal, his company uses code numbers to designate each size or type made. A few years ago there were 25, now its code numbers total 38.

Mr. Pursglove decried the air of mystery that prevails because operating departments fail to give the salesmen enough information. He sees the need of training young men in the operating department for later transfer to sales, also believes that the sales department should have an inspector at the mine, but characterized as a waste of time an inspector reporting to an unsympathetic operating department.

Standards for cleaning and screening are a present need and "eventually coal will be sold on a chemical basis," contended Mr. Forester. Salesmen are but mouthpieces for customers. Operating departments talk in mills when working out savings but salesmen cut the price in 5c. steps. Some years ago they cut in 20 to 25c. steps. Seasonal business Mr. Forester pointed out as the great difficulty in coordinating sales and operation. An increase of 10 to 20 per cent in fines by mechanical loading introduces a new factor.

Referring to proposals for establishing standards based on ash content, O. G. Schwant, general manager of operations, Hutchinson Coal Co., spoke of the difficulty presented by reason of oxygen content materially affecting the B.t.u. value. He also deplored the salesman's habit of cutting price by a nickel without an idea of how hard the operating department must work to effect that much saving. He pointed out that price cuts are authorized by a sales manager, and that sales manager reports to a company president.

"Better sell one ton of coal and make 10c. than sell 100,000 tons and loose 10c.," was the comment of Gilbert Smith, general manager, Fire Creek Coal & Coke Co., who placed blame for price cutting directly on the coal operator and "not on the salesman or consumer's purchasing agent."

A new employee should be selected with the same care as when selecting a new $10,000 machine, prefaced J. Lindley, director of safety, Koppers Coal Co., Mt. Hope, in his paper, "Safety." Education so that men can recognize hazards he enunciated as the basis of all accident prevention. On the foreman rests the great responsibility of explaining safe methods over and over until he is sure the workman understands, getting the workman into the right frame of mind, and treating him as a human being, but meting out punishment for careless acts whether or not they have resulted in an accident.

Safety would be assured to a large extent if provisions of the mining laws were more closely followed, was the comment of Mr. Forester, and he placed some blame on enforcement officials for condoning infractions. "Success in safety," he said, "can be measured largely by the attitude of the management."

H. B. Husband, division manager, Consolidation Coal Co., Jenkins, Ky., presented a paper reviewing developments in mechanical mining and related phases of operation and pointedly warned that "the mine which cannot successfully mechanize must in a few years pass out of the picture." Referring to charges that bituminous mining is a backward industry and losing to competitive fuels, he said that modernization is rapidly changing the picture, "for, after all, the purchaser is mainly interested in getting units of heat at the lowest possible cost, and coal certainly can do this."

Three prime requisites for mechanical loading were briefed by J. J. Foster, assistant to the vice president, Island Creek Coal Co., as follows: Select the proper equipment for the working condition; furnish adequate power to the working face, and supply capable and abundant supervision. Tons per lost-time accident thus far in 1941 at Island Creek mines, now 100 per cent mechanized, have averaged 89,000, compared to 13,000 in

1936, the year that the first loaders went into regular service. A move is under way to work into the organization young engineers who will develop into section foremen. In coal preparation, Mr. Foster concluded, selection of a certain type of equipment may not be so important as the maintenance, supervision and adjustment during every-day operation.

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Tennessee Products Coke Output To Be Doubled

Twenty new coke ovens to be constructed for the Tennesseee Products Corporation at its Chattanooga (Tenn.) plant will practically double the plant's production. The plant already has 24 ovens in operation carbonizing 450 tons of coal daily, and the additional ovens are to consume a like quantity. A building permit of $1,520,000 for the expansion has been issued, and the work is to be completed in late November by the Wilputte Coke Oven Corporation.

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Rearranging the Pictures

In the group of pictures appearing on page 43 of last month's *Coal Age*, the third from the left on the top row was incorrectly designated as E. E. Ritter, president, Red Jacket Coal Corporation. That picture should have been captioned E. B. Agee, superintendent, Dehue mine, Youngstown Mines Corporation, Dehue, W. Va. Mr. Ritter's picture appears on page 41, and is correctly captioned there.

Grounding Practices

(Concluded from page 55)

ning stroke.[5]" With a direct lightning stroke, even where low-impedance ground is obtained, a relatively high potential difference may momentarily exist across the ground connection.

In making ground connections, the National Electrical Code suggests always using a continuous metallic underground water-piping system as the grounding electrode whenever available. When not available, any one or a combination of the following methods may be used: (a) The metal frame of the building if effectively grounded; (b) a continuous metallic underground gas-piping system; (c) a local metallic underground piping system, metal well casing and the like; (d) an artificial ground whose electrode is a driven pipe, buried rod, plate or other device approved for the purpose.

Make the ground lead short and adequate. It should not be run near magnetic materials nor in iron piping. If soil treatment is used, the chemicals should be regularly added. Soil and weather conditions should be taken into consideration, particularly during tests. A lower test value usually can be obtained after a good rain.

Frequent testing and complete inspection are essential. The actual ohmic resistance cannot be told by observation. It must be measured by the use of suitable equipment.

[5] *Principles and Practices in Grounding*: Edison Electrical Institute, 1936.

Production of Coke, Briquets And Packaged Fuel Gains

Output of coke in the United States in 1940, according to the U. S. Bureau of Mines was: byproduct, 54,014,309 net tons, valued at $260,356,566; beehive, 3,057,825 tons, valued at $13,475,844. In the preceding year, 42,882,313 tons of byproduct, coke, valued at $206,457,873, and 1,444,328 tons of beehive, valued at $6,426,177, was produced.

Fuel briquets produced in the United States in 1940 totaled 1,050,870 net tons, valued at $6,438,952, which compares with 892,213 tons, valued at $5,801,666, in the preceding year.

Packaged fuel production in 1940 amounted to 284,513 tons, valued at $2,391,922, against 215,507 tons, valued at $1,866,751 in 1939.

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Anthracite Utilization Canvassed At New England Meeting

With the primary objective of educating the retail fuel merchant and allied heating trades to assume their responsibilities in the event of emergency shortages of fuel oil, the New England Conference on Anthracite Utilization opened June 19 at Massachusetts Institute of Technology, Boston, Mass., with James A. Moyer, director of the Massachusetts Department of Education, as general chairman. It was pointed out to the large number of New England fuel dealers, engineers, stoker equipment manufacturers, as well as representatives of industrial companies, in attendance that because of the likelihood of such shortages many home owners are faced with a serious problem in obtaining heat next fall. A plentiful supply of anthracite will be available to take the place of oil in both domestic and commercial heating, but it will be necessary to adapt many consumers' heating plants to burn coal instead of oil.

Opening the program with an outline of the factors to be considered in human comfort, Prof. C. P. Yaglou, Harvard School of Public Health, described the necessity for designing household heating around human beings according to their several temperaments. Following this, Henry F. Miller, sales manager, Hershey Machine & Foundry Co., discussed the various types of automatic stokers available for use in domestic heating.

Allen J. Johnson, director, Anthracite Industries Laboratory, outlined the activities of the laboratory in the development of equipment to improve present heating in the home. Continuing on the subject of research, Dr. H. J. Rose, Anthracite Fellowship, Mellon Institute, graphically demonstrated that anthracite can be as clean and convenient as any other fuel, and, further, that ashes are by no means valueless or the unmitigated drawback to anthracite that the casual observer might assume.

During the afternoon session, M. A. Young, general manager, Catskill Metal Works, called attention to trends in boiler and furnace design that would vastly improve the utilization of anthracite. Accompanying the paper was a design from the standpoint of coordinating combustion and handling of anthracite.

In the absence of Carl A. Fraser, president, Carl A. Fraser, Inc., Edward H. Walker, advertising manager of Anthracite Industries, Inc., brought out the importance of conditions arising out of the present emergency with particular respect to probable oil shortages and explained to dealers how they could solve the problems of fuel supply so as to alleviate any discomfort in homes due to dearth of oil.

In a paper analyzing anthracite's position in the present-day fuel market, which closed the day's session, J. D. Jillson, sales engineer, Anthracite Industries, Inc., predicted "an increased market for the anthracite industry as a result of fast approaching war-time economy."

Under the chairmanship of Frank H. Larkin, president, Retail Fuel Institute, Boston, the first session of the second and concluding day included the following papers: "Magazine and Self-Feed Principle Applied to Anthracite-Burning Equipment," J. E. Axeman, general sales manager, Spencer Heater Division, Aviation Mfg. Corporation; "Practical Pointers in Domestic Stoker Installations," A. H. Bearse Jr., New England manager, Anthracite Industries, Inc.; "The Use of Degree Day Calculation in the Retail Coal Industry," L. N. Burnside, manager, equipment sales, D. L. & W. Coal Co.

Irving G. Smith, treasurer, Newell Coal & Lumber Co., Pawtucket, R. I., presided at the final session, when these papers were presented: "Performance of Anthracite-Fired Water Heaters," R. C. Johnson, Anthracite Fellowship, Mellon Institute; "Practical Results From the Burning of Anthracite on Commercial Underfeed Stokers," William Stein, Combustion Engineering Co.; "Thermostatically Controlling Anthracite-Burning Equipment," Arnold Michelson, vice president, Minneapolis-Honeywell Co.

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Out-of-Work Benefits Denied

Although about 1,500 Iowa coal miners drew employment security benefits of $25,000 to $30,000 in April, according to State Employment Security Commission records, the benefits were not paid because of the shutdown in mining between April 1 and May 6, caused by union contract negotiations, the Commission said. Officials said benefits were paid because Iowa mines normally shut down prior to April 1; 2,500 Iowa miners who applied for benefits because of the suspension of mining caused by the negotiations were denied compensation because they were adjudged to have been idle because of a labor dispute, which does not entitle employees to such benefits.

The U. S. Supreme Court has declined to issue a writ of certiorari to obtain a review by that tribunal of the decisions of the Alabama Supreme Court and Appeals Court, which sustained the ruling of the State Department of Industrial Relations not to allow unemployment compensation to mine workers employed by the Tennessee Coal, Iron & Railroad Co. who were idle because of delay in negotiating a new wage agreement with the United Mine Workers in 1939. The Alabama tribunals held that the lost time was due to a wage dispute between the workers and their employers, which precluded the payment of compensation under the Alabama law.

Unemployment payments have been refused mine workers in Illinois affected by

the recent work stoppage, but Governor Dwight H. Green has given his pledge that they will get a fair hearing on their request for reconsideration. Ray Edmundson, State president of the United Mine Workers, has urged the chief executive to appoint another referee to consider the case.

Pennsylvania miners idle because of the failure of operators and the U. M. W. to reach a wage agreement have received compensation checks under the law. Almost 30,000 claims for compensation due to the shutdown were filed in the first two weeks, but the number greatly increased later because many miners delayed making application in the expectation that there would be an early settlement.

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Canada's Coal Mines Listed As Essential Services

All Canadian coal mines were listed on June 7 as "essential services" within the terms of the Defense of Canada Regulations, and authorities were empowered to use provisions of that war-time measure to proceed against persons who impede production or impair the efficiency of collieries. This drastic move against further interference with coal production was taken by order-in-council.

Officials said this would not interfere with the legal rights of trade unions, but was aimed against those who operate to reduce production or persuade miners to stop work and in general against all who illegally interfere with the output of coal.

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Fire Destroys Pursglove Tipple

Fire of unknown origin razed the tipple at mine No. 15 of the Pursglove Coal Mining Co., at Pursglove, in Scotts Run, Monongalia County, West Virginia, May 28, causing damage estimated at more than $100,000. Mine Superintendent J. H. Stewart announced that work would continue without interruption. The leveled building will be replaced as soon as possible, he added.

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To Enlarge Gorgas Plant

Plans have been announced by the Alabama Power Co. for construction of an additional 60,000-kw. unit at the Gorgas steam plant of the company, in Walker County, Alabama. Application has been made to the Alabama Public Service Commission for a certificate of convenience and necessity for the new unit. The plant will use about 700 tons of powdered coal daily when operating at capacity, and will require a boiler capacity of 600,000 lb. of steam per hour. The cost is estimated at more than $4,500,000, and completion is set for May 1, 1943. The additional capacity is being provided to increase defense needs.

The company recently acquired the large coal holdings of the Southeastern Fuel Co. adjacent to the Gorgas steam plant, and contemplates putting the Winona mine in operation as soon as practicable to provide a large part of the coal supply for the plants. This mine was operated to provide partial coal tonnage for the generating facility at one time, but has been idle for about twelve years.

Southern Illinois Electric Group Inspects Grand Tower Power Station

THE Southern Illinois Mining Electric Group made an inspection trip to the Grand Tower generating station of the Central Illinois Public Service Co., near Grand Tower, Ill., June 15, for its final meeting of the season. In a narrow, grass-carpeted park, between Fountain Bluff and the Mississippi River, the setting for this power plant resembles a summer resort rather than a machine of industry. The serene beauty of the environment contrasts sharply with the sleepless activity inside the power house. Withal, both indoor and out, everything is groomed and spotlessly clean—eloquent evidence of good housekeeping. Even the coal-handling equipment is so camouflaged by the freshly mowed lawn and the leafy trees as to shift one's thoughts from grim business to restful beauty.

The output of this plant goes almost wholly to the coal-mining industry of Egypt and to its dependents. There is little manufacturing within convenient reach. In 1939, just under two-thirds of its load demand came directly from mines. With unlimited condensing water that has merely to be pushed through the condensers, and being only about 35 miles from the center of its mining load and from its coal supply, it is literally "shipping coals to Newcastle."

The power equipment consists of six Babcock & Wilcox cross-drum 375-lb.-gage-pressure water-tube boilers capable of making a total of 600,000 lb. of steam per hour, two Westinghouse 25,000-kw. 13,200-volt 0.90-percent-power-factor 1800-r.p.m. turbo-generators —all the usual stokers, condensers and other auxiliary equipment that go to make a modern power plant. A normal day's coal supply is 480 tons. It comes from mines served by the plant. Boiler water is from deep wells and condensing water is from the Mississippi River.

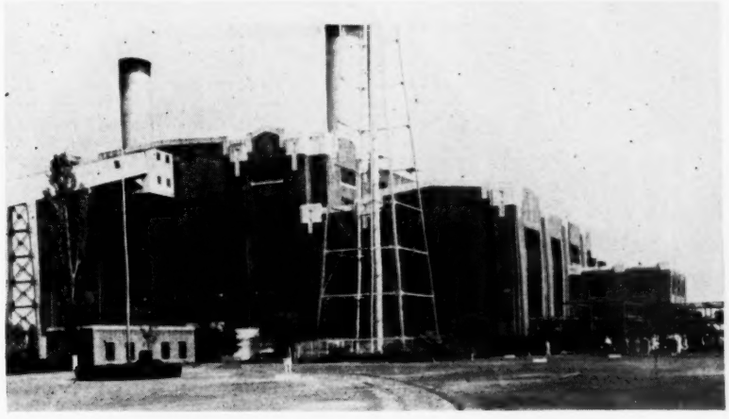
Each boiler has 11,599 sq.ft. of heating surface. Steam is super-heated to a total temperature of 726 deg. F. by 2,170 sq.ft. of super-heating surface. The stokers are Illinois and Coxe chain grates having 323 sq.ft. of surface each, and are capable of burning 65 lb. of coal per square foot of grate surface per hour with 1 in. forced draft. Induced-draft fans deliver the furnace gases to the stack. Capacity of these fans is 50,000 and 80,000 cu.ft. per minute, respectively.

D. D. Wright

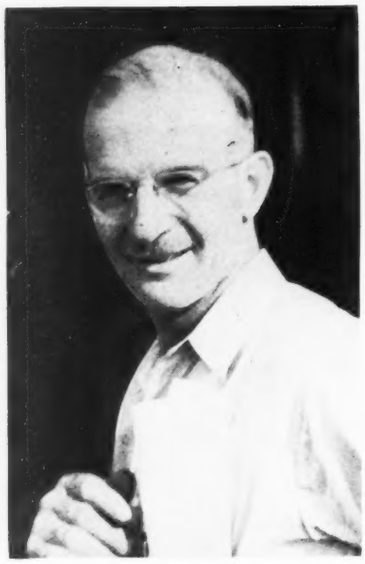
First president, Southern Illinois Mining Electric Group.

Each turbine is served by a Worthington vertical surface condenser having 35,000 sq.ft. of surface, and a Worthington 35,000 g.p.m. circulating pump direct-connected to a General Electric 400/145 hp. vertical motor. The vacuum on the day of this visit was 29.2 in. Each generator is cooled with approximately 80,000 cu.ft. per minute of spray-washed air.

To serve southern Illinois coal mines, this power plant is connected by a 66,000-volt double-circuit transmission line to a 50,000-kva. substation at West Frankfort. From that point the line extends to Harrisburg, where it ties into the Muddy power plant, with 25,000-kw. generating capacity, and continues to the Kentucky State line, where



Grand Tower power plant, Central Illinois Public Service Co.



Stanley Durst
Secretary, Southern Illinois Mining Electric Group.

there is a connection with Kentucky Utilities Co.

From the West Frankfort substation 33,000-volt transmission lines cover one of the most important coal-mining fields in the State. Well within a radius of 15 miles from this substation is mined approximately 25 per cent of the coal in Illinois.

Since 1934, the 25 principal coal mines served by District C, Central Illinois Public Service Co., mostly by the West Frankfort substation, have increased annual coal production from 10,000,000 to 13,500,000 tons, or 35 per cent. During this period, purchased electric power has increased 82 per cent to 82,500,000 kw.-hr. per year. In the same period, cost of power to this group of mines decreased about 30 per cent per kilowatt-hour. Total demands of individual mines increased 37 per cent to 37,000 kw.

In the four counties, Franklin, Jackson, Saline and Williamson, where most of this power is sold, approximately 75 per cent of the coal is mined with C.I.P.S. Co. power. A new generating station at Hutsonville has just been put into service and a fourth station is planned for Meredocia. There are interconnections to Keokuk and to Indiana utilities. This network of lines and power provides a flexibility of power service not possible with isolated generating plants. Such a system makes available quick power to meet increased coal output or preparation facilities. District C serves its customers over 545 miles of 66,000- and 33,000-volt circuits and 243 miles of lower-voltage lines.

Many coal-mining companies do not have the personnel or instruments necessary to study their knotty electrical problems, such equipment often being too expensive to justify its purchase for occasional use. Besides, there is the question of keeping unused instruments in calibration. Central Illinois Public Service Co. maintains a corps of engineers and a collection of testing instruments that are available to its customers. That service goes along with power service at no extra charge.

Members of the M.E.G. and their families are indebted to D. D. Wright, its first president, and to Stanley Durst, its present secretary, who are both members of the power company's staff, for making this trip pleasant, entertaining and instructive.

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Coal-Mine Accident Fatality Rate Shows Slight Increase

Accidents at coal mines of the United States caused the deaths of eleven bituminous and eleven anthracite miners in April last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 6,266,000 net tons, the accident death rate among bituminous miners was 1.76 per million tons, compared with 1.74 in April, 1940.

The anthracite fatality rate in April last was 3.43, based on an output of 3,203,000 net tons, against 5.07 in the corresponding month a year before.

For the two industries combined, the accident fatality rate in April last was 2.32, compared with 2.08 in the fourth month of the preceding year.

Fatalities during April last, by causes and States, as well as comparable rates for the first four months of 1940 and 1941, are shown below.

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3 Killed and 13 Injured In Alabama Blast

Three men were killed and 13 others injured, several seriously, in an explosion June 4 in the Docena mine of the Tennessee Coal, Iron & Railroad Co., 12 miles from Birmingham, Ala. There were 464 men in the workings at the time of the accident.

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Bicknell Mine, Scene of Blast, Owned by Miners

In a preliminary report on the explosion of May 22 at the mine of the Bicknell Coal Co., near Bicknell, Ind., the Bureau of Mines states that ignition of mine gas by a non-permissible cutting machine is believed to have been the cause. The report states, further, that the owner of the mine, the Bicknell Coal Co., is a cooperative organization to which 184 miners belong, each owning ten shares of stock, and that the men do not belong to any miners' organization.

Poor supervision on the part of the management was blamed on June 13 by Fred Ferguson, director of the Indiana Bureau of Mines, for the explosion. He charged that the blast was caused by ignition of an accumulation of methane, which could have been averted if doors had been kept closed. He alleged that one or more doors had been left open.

Left to right: Ed. Lutz, chief electrician, West Frankfort group, Old Ben Coal Corporation, and Lee Reed, chief electrician, Peabody mine 18, chat with D. D. Wright, power salesman, C.I.P.S. Co.

UNITED STATES COAL-MINE FATALITIES IN APRIL, 1941, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Electricity	Machinery	Other Causes	Total Underground	Shaft	Surface	Grand Total
Colorado	1	..	..	..	..	..	1	..	..	1
Illinois	1	..	..	..	..	..	1	1	..	2
Kentucky	1	..	1	..	..	..	2	..	..	2
Ohio	1	..	..	..	..	..	1	..	..	1
Penna. (bit.)	..	..	..	..	1	..	1	..	..	1
West Virginia	4	..	..	..	..	..	4	..	..	4
Total bituminous	8	..	1	..	1	..	10	1	..	11
Penna. (anth.)	5	1	2	1	..	1	10	..	1	11
Grand total	13	1	3	1	1	1	20	1	1	22

FATALITIES AND DEATH RATES AT UNITED STATES MINES, BY CAUSES*
January–April, 1940 and 1941

Cause	Bituminous: Number Killed		Killed per Million Tons		Anthracite: Number Killed		Killed per Million Tons		Total: Number Killed		Killed per Million Tons	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Underground:												
Falls of roof and coal	188	138	1.235	0.984	35	34	2.097	1.976	223	172	1.320	1.092
Haulage	66	49	.433	.349	18	10	1.078	.582	84	59	.497	.375
Gas or dust explosions:												
Local	5	5	.033	.036	1	2	.060	.116	6	7	.035	.044
Major	163	5	1.070	.036	...	...	.....	.....	163	5	.965	.032
Explosives	9	8	.059	.057	3	3	.180	.174	12	11	.071	.070
Electricity	8	5	.053	.036	3	1	.180	.058	11	6	.065	.038
Machinery	11	11	.072	.078	...	...	.....	.....	11	11	.065	.070
Shaft	1	1	.006	.007	1	1	.060	.058	2	2	.012	.013
Miscellaneous	10	...	.066	.....	2	3	.120	.174	12	3	.071	.019
Stripping or open-cut	5	12	.033	.085	2	1	.120	.058	7	13	.041	.082
Surface	14	10	.092	.071	3	6	.180	.349	17	16	.101	.102
Grand total	480	244	3.152	1.739	68	61	4.075	3.545	548	305	3.243	1.937

* All figures subject to revision.

Agency Provisionally Approved And Safeguards Provided

Indiana Coals, Inc., Terre Haute, Ind., has been provisionally approved by the Bituminous Coal Division as a regional coal marketing agency. It was organized as the sales representative of member mines in Indiana, with the exception of those producing "Brazil Block" coals.

Division Director Howard A. Gray states that the division is considering review of provisional approval previously granted to more than a dozen other such agencies with the view of taking any steps that may be appropriate to improve protection for coal consumers. Special safeguards have been adopted to improve the protection of consumers by providing for constant division scrutiny of agency price-fixing activities and the refund to purchasers of that portion of any price which the division may find to be excessive.

Membership of the Bituminous Coal Producers' Board for District 10 (Illinois) was increased from three to five at the biennial election of the group on June 3. The four new members of the board are George A. Miller, general sales agent, Peabody Coal Co.; M. M. Soule, vice president in charge of sales, United Electric Coal Cos.; B. R. Gebhart, vice president in charge of sales, Chicago, Wilmington & Franklin Coal Co., and Arleigh Wilkins, Marion truck-mine owner. The fifth member, Ray Edmundson, president, District 12, United Mine Workers, carries over from the preceding term. The retiring members, who have served for the last two years, are E. I. Carr, Bell & Zoller Coal & Mining Co., and C. J. Sandoe, vice president, Perry Coal Co.

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Blue Diamond to Operate V. I. C. C. Coal Mines

Under a lease and rental arrangement, the Blue Diamond Coal Co. will take over and operate the Virginia Iron, Coal & Coke Co.'s coal mines in Wise and Lee counties, Virginia, as of July 1. Under the arrangement the Blue Diamond company will operate the mines with personnel employed by the Virginia company, and J. J. Sellers, who has been operating vice president of the latter company, will become the operating officer of the same mines for the Blue Diamond company. Blue Diamond also has operations in Kentucky, Tennessee and Virginia.

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Obituary

Orrin M. Cross, 61, president of the Little Gem Coal Co., Birmingham, Ala., until his retirement, about two years ago, because of ill health, died June 5 at his home in Cottage Hills, Fla.

Lawrence A. Hill, 49, assistant superintendent, Orient No. 1 mine, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., died early in June after ten weeks in the U. S. Veterans Bureau Hospital, Hines, Ill. Mr. Hill had been with C. W. & F. for 22 years.

Charles C. Watt, associated for 59 years with the Loyal Hanna Coal & Coke Co., operating in western Pennsylvania, died late in May. From 1882 to 1936 he was actively in charge of operations, guiding sales policies, etc. He held the office of president for 20 years and continued as a director until his death.

Harry Kelly Sr., retired coal-mine operator and superintendent of the Sunday Creek Coal Co. for 25 years, died June 5 in Nelsonville, Ohio.

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May Release From Service Men Essential to Defense Work

A soldier who held a key position in a defense industry prior to his induction or enlistment and whose services are now required by his former employer by reason of the expansion of industrial activities or the shortage of skilled employees may under certain conditions be released from military service to enable him to return to his civilian post, according to an announcement by the War Department. In order to do so, however, it will be necessary to establish to the satisfaction of the War Department that such an individual is a key man, that he is absolutely necessary and essential in an industry.

An employer requesting a soldier's release must agree to reemploy the soldier immediately upon his release from service. Each case will stand on its own merits; no blanket releases will be granted. The matter will be handled by the Under Secretary of War. If a defense industry is being seriously handicapped and needs one who has gone into the service, the employer should take it up by addressing the Under Secretary of War, giving all details, salary previously paid, reason the individual left the firm's service, steps taken to obtain deferred classification, present whereabouts of soldier, if known; previous experience of the individual, and why it is absolutely essential that he be returned to industry.

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New Preparation Facilities

Alabama Power Co., Birmingham, Ala.: Contract closed with Jeffrey Mfg. Co. for single-compartment diaphragm jig to handle 60 t.p.h. of 0x1½-in. coal.

Ayrshire Patoka Collieries Corporation, Chinook Mine, Staunton, Ind.: Contract closed with McNally-Pittsburg Mfg. Corporation for McNally-Vissac dryers to dry 1¼x¾-in. washed coal at rate of 160 t.p.h.; to be completed about October, 1941.

Berwind-White Coal Mining Co., Eureka No. 40 Mine, Windber, Pa.: Contract closed with Fairmont Machinery Co. for 10-ft.-diameter Chance cone with raw-coal feed to plant of 250 t.p.h., cleaning 150 t.p.h. of 4x⅜- or 2x⅜-in. coal; addition to existing plant; to be completed about Dec. 1.

Carter Coal Co., Olga No. 1 Mine, Coalwood, W. Va.: Contract closed with Kanawha Mfg. Co. for three Kanawha-Belknap washers to clean egg coal (100 t.p.h.), stove coal (100 t.p.h.) and nut coal (75 t.p.h.).

Ebensburg Coal Co., Colver, Pa.: Contract closed with Jeffrey Mfg. Co. for tipple addition to handle 85 t.p.h. of lump coal.

Elk Horn Coal Corporation, Wayland, Ky.: Contract closed with Jeffrey Mfg. Co. for tipple additions to handle 600 t.p.h. of 5x¾-in. coal.

Gilberton Coal Co., Gilberton, Pa.: Contract closed with Wilmot Engineering Co. for cleaning plant to prepare stove to No. 4 sizes of anthracite, including Chance cone for stove to No. 1 buckwheat, two 5-ft. and one 6-ft. Wilmot Hydrotators for rice, barley and No. 4; Wilmot rolls, screens and other equipment; capacity, 250 t.p.h. of feed; to be completed in 12 to 16 weeks.

Glogora Coal Co., Blue Pennant Mine, Red Dragon, W. Va.: Contract closed with Fairmont Machinery Co. for secondary crushing and rescreening plant handling 300 t.p.h. of 0x3-in. coal which will be crushed to 1¼ in., making 1¼x⅜- and 0x⅜-in. products; addition to existing plant; to be completed about Dec. 1.

Hickory Grove Coal Mining Co., Jasonville, Ind.: Contract closed with Jeffrey Mfg. Co. for dewatering screen to handle 350 t.p.h. of 0x4-in. coal.

Ill-Mo Coal Co., Sparta, Ill.: Contract closed with Steel Washeries, Inc., for Montgomery washer to clean 0x3-in. coal complete with spraying, dewatering and sizing screens to produce necessary domestic sizes (capacity, 25 t.p.h.); also picking tables and loading booms for 6x4-in. egg and lump sizes.

Johnson Coal & Coke Co., Crichton, W. Va.: Contract closed with Kanawha Mfg. Co. for screening and loading equipment for nut and pea coal; capacity, 120 t.p.h.

Jones & Laughlin Steel Corporation, Hazelwood Plant, Pittsburgh, Pa.: Contract closed with McNally-Pittsburg Mfg. Corporation for one McNally-Rheo fine-coal cleaning plant to clean 0x⅞-in. coal at rate of 160 t.p.h.; plant to be equipped with Carpenter centrifugal dryers, Dorr thickener for recovery of slurry, and vacuum filters to remove moisture from slurry; to be completed about Feb. 1, 1942.

Maryd Coal Mining Co., Maryd, Pa.: Contract closed with Wilmot Engineering Co. for cleaning apparatus to prepare buckwheat, rice and barley; equipment to consist of one 5- and one 6-ft. Wilmot Hydrotators with high-speed Wilmot screens for dewatering; capacity, 80 t.p.h. of feed; to be completed in about six weeks.

Montana Coal & Iron Co., Washoe, Mont.: Contract closed with Jeffrey Mfg. Co. for single-compartment diaphragm jig to handle 100 t.p.h. of 5x¾-in. coal.

Raleigh Coal & Coke Co. Mine No. 3, Raleigh, W. Va.: Contract closed with Jeffrey Mfg. Co. for washing plant to clean 250 t.p.h. of 3x¼-in. coal.

Raleigh-Wyoming Mining Co., Glen Rogers, W. Va.: Contract closed with Kanawha Mfg. Co. for screening and cleaning plant to handle 200 t.p.h. of 0x¾-in. raw-coal feed separating at ⅞ in. over "Selectro" vibrators, cleaning ¾x⅞-in. on three American air tables and one retreatment table; all housed in complete

steel structure, including 400-ton-capacity storage and loading-out bins.

REITZ COAL CO., Windber, Pa.: Contract closed with Jeffrey Mfg. Co. for tipple addition to handle 6 t.p.h. of refuse.

ST. LOUIS, ROCKY MOUNTAIN & PACIFIC CO., Brilliant, N. M.: Contract closed with Jeffrey Mfg. Co. for standard unit coal washer to clean 60 t.p.h. of 3x¾-in. coal.

STAR MINING CORPORATION, Salem, Ohio: Contract closed with Jeffrey Mfg. Co. for tipple to handle 60 t.p.h. of lump coal.

UNITED THACKER COAL CO. (Lando Coal Corporation), Delbarton, W. Va.: Contract closed with Jeffrey Mfg. Co. for unit washery to clean 75 t.p.h. of 0x5-in. coal.

WOOD COAL CO., Ethel, W. Va.: Contract closed with Kanawha Mfg. Co. for mine-run bin and apron feeder; capacity 100 t.p.h.

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Sealing Enables Mine to Resume Quickly After Fire

A fall which short-circuited a trolley wire caused a $50,000 fire June 7 in the Robinson Run mine of the Christopher Coal Co., Maidsville, W. Va. The flames occurred in the Seventh Right Section, the farthest entry in the mine, but by the time they were discovered they had made such headway that sealing seemed to be best procedure to follow. Accordingly sealing was completed about 18½ hours after the start of the fire, and operations were resumed 54½ hours later.

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Acquires Large Coal Tract

Purchase of a tract of 2,106 acres of coal land by the Wyoming Mining Corporation, Oceana, W. Va., from the Sprague Land Co., of Boston, Mass., was disclosed in a deed filed late in May at Pineville, W. Va.

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Industrial Notes

E. I. DUPONT DE NEMOURS & CO. is to build and operate a new neoprene synthetic rubber plant at Louisville, Ky. Construction is to begin immediately. The capacity of the new plant, 10,000 gross tons a year, exceeds the present combined production of all synthetic rubbers, including neoprene which is being made in the duPont plant at Deepwater, N. J., at the rate of 6,000 gross tons annually. With additional facilities now being built, production at the company's New Jersey plant will be increased to 9,000 tons before the end of this year.

LINK-BELT CO. has appointed Laurence M. Ewell as general manager of Eastern division operations, with headquarters in Philadelphia. Mr. Ewell, who until now has been export manager, will be succeeded in the latter position by his assistant, Carl A. Woerwag, with headquarters in New York, as heretofore.

DUFF-NORTON MFG. CO., Pittsburgh, Pa., has appointed E. C. Gunther as district manager, Midwest territory, succeeding the

late Alex S. Anderson. Mr. Gunther's headquarters will be at the company's offices, Peoples Gas Building, Chicago.

HERCULES POWDER CO., Wilmington, Del., has elected Petrus W. Meyeringh as a vice president and member of the executive committee. Albert E. Forster, general manager of the naval stores department, and Luke H. Sperry, chief engineer, were elected directors.

WORTHINGTON PUMP & MACHINERY CORPORATION, Harrison, N. J., announces the retirement of A. W. Parker after 54 years of continuous service. He joined the company in 1887 as a draftsman. Through many years he served as mechanical engineer and product designer and contributed importantly to the development of a variety of pumping machinery. Later he entered the publicity department, in which he was engaged until his retirement.

CHAIN BELT CO., Milwaukee, Wis., has appointed D. A. Kalton and W. A. Thomas as assistants to the sales manager of the construction equipment division. Mr. Kalton has been with the company since graduation from Marquette University in 1932 and has served both in the home office sales department and as Eastern district manager. Mr. Thomas, who also is a former district manager, has been connected with the company since 1927. He has been in both the sales and engineering departments of the construction equipment division and is a graduate of Purdue University in civil engineering.

MORRIS MACHINE WORKS, Baldwinsville, N. Y., has named L. J. Lynch as its new representative in the Detroit district. Mr. Lynch is located at 403 Kales Building.

B. F. GOODRICH CO., Akron, Ohio, has elected George T. Kilmon as assistant secretary and Edward M. Martin as assistant treasurer. Mr. Kilmon, member of the Goodrich legal staff for the last 16 years, will fill the vacancy caused by the death of J. L. McKnight and will be in charge of the company's law department. He joined the company in 1925 following his graduation from the University of Virginia. Mr. Martin joined Goodrich in 1920 as a member of the Akron credit department, later going to Toledo, Atlanta and New York City in managerial capacities for this department. Clyde DeLong is named operating manager of the mechanical sales division. Graduated from Miami University, Oxford, Ohio, in 1927 with a B.S. degree, he joined the Goodrich company in 1928 as a clerk.

COPPERWELD STEEL CO., Warren, Ohio, has appointed Norman L. Deuble, formerly assistant to vice president, as manager of sales. A graduate of the Case School of Applied Science with the degrees of B.S. and Metallurgical Engineer, Mr. Deuble was with Republic Steel Corporation, Central Alloy Co. and United Alloy Steel Co. before joining Copperweld.

FALK CORPORATION, Milwaukee, Wis., manufacturer of transmission machinery, has appointed W. L. Schneider as vice president in charge of sales; T. F. Scannell as sales manager, and J. B. Kelley as assistant sales manager.

DODGE BROTHERS CORPORATION, Detroit, Mich., has appointed Allison Miller as assistant sales manager, truck division. Previous to this appointment he was Philadelphia regional manager. He joined the company in 1925 as district manager in the Dallas (Texas) region.

TIMKEN ROLLER BEARING CO., Steel and Tube Division, has appointed Harry McCool, Jr., southwestern sales representative with headquarters at Dallas, Texas.

INDUSTRIAL PRODUCTS CO., manufacturer of safety equipment, has moved from 800 West Somerset St. to larger quarters at 2820 North Fourth St., Philadelphia, Pa.

GREENE, TWEED & CO., manufacturer of packings and special tools, has moved its manufacturing plants and general offices to the Palmetto Building, Bronx Boulevard and 238th St., New York City.

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Experiments With Breaker Waste For Building Materials

Study and experiments on the possibility of using breaker waste in the manufacture of building materials and for other uses by the Lehigh Navigation Coal Co., Lansford, Pa., have reached an advanced stage. The waste is composed primarily of "slates" with an admixture of coal, which it is believed has a large potential market for light-weight aggregate to be used in concrete.

A pilot plant which the company is about to erect is expected to furnish a conclusive answer as to the production possible from a given unit or units, cost of production, and the quantity of waste that will be available for other purposes, etc. When this plant has been in operation long enough to throw light upon the above details, an article covering these facts will appear in *Coal Age*—probably late next autumn.

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New Hammond Breaker on Way

Work was started late in May on a new breaker for the Hammond Coal Co. at Shenandoah, Pa. The structure will cost about $100,000 and will be rushed to completion for use early next autumn. It will replace a breaker destroyed by fire several weeks ago.

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Frontier Cannel Changes Hands

Frontier Cannel Coal Co., Prestonburg, Ky., of which Charles W. Alley is president, has sold its leasehold and mining equipment to F. M. A. Leach, of New York City. The latter in turn has leased the property to A. B. Ewen, of Charleston, W. Va., who is now operating the property.

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Predicts Large Coal Output

Analyzing the prospective coal situation, the *Wall Street Journal* of June 9 predicts a marked increase in coal production this year. Pointing out that consumers' stockpiles have run low because of the suspension of mining in April, the financial publication says the soft-coal industry must produce during the latter months of this year the largest tonnage for any similar period since 1926 to meet prospective requirements.

Storage of Coal Reserves Urged By Advisory Commission

All coal users and dealers—particularly the railroads—have been notified of adoption of a resolution by the advisory commission to the Council of National Defense urging that they order and store as much coal as practicable between now and the first of October. Full cooperation in this respect, the commission points out, will spread the load, both as to mining and transportation, over a period generally slack so far as coal production and movement are concerned, and operate to diminish the peak demand experienced in October and November. Similar advice was broadcast over the Mutual Broadcasting System on June 13 by Karl Fischer, Deputy Coordinator of Transportation, Office for Emergency Management; Miss Harriet Elliott, consumer adviser, Office of Price Administration and Civilian Supply; and Paul Sifton, acting director of the office of Bituminous Coal Consumers' Counsel. Massachusetts citizens received advice along the same line from F. L. Higginson, director of the Division of Service and Supplies, State Committee of Public Safety.

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Diamond Core Drill Fittings Standard Revised

The commercial standard for diamond core drill fittings has been revised, effective for new production from Jan. 1, 1942 (now known as Commercial Standard CS17-42). The revision, drafted by the Diamond Core Drill Manufacturers' Association and accepted and approved for promulgation by the U. S. Department of Commerce, through the National Bureau of Standards, covers standard designs and tolerances with controlling dimensions for rod couplings, drill rods, core-barrel bits, reaming shells, core-barrel outer tubes, core-barrel inner tubes, casing couplings, flush-coupled casings, flush jointed casings and casing bits.

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Mineral Economists Sought By the Government

In connection with the national defense program, the Government is looking for persons especially qualified in the economic aspects of the mineral industries to do professional research in the fields of minerals, coal and petroleum. Civil service examinations for these positions are now open, and applications will be received by the Civil Service Commission, Washington, D. C., until further public notice. Applications will be rated as received, but interested persons are urged to file applications at once.

Completion of a four-year college course with major study in such subjects as geology, metallurgy, mining engineering, economics or political science is required. However, persons who have had only two years of college study may substitute two years of experience dealing with economic aspects of the mineral industries. In addition, all applicants must have had progressive professional experience dealing with the economics of mineral industries. At least some of this experience must have been in research in either metallic minerals, coal, petroleum, or general mineral

economics. Graduate study in mineral economics may be substituted, in varying degrees, for the experience required.

Mineral economists will plan or conduct professional research in mineral economics dealing with the conservation, utilization, extraction, refinement, marketing, consumption, and foreign and domestic sources of minerals. This will include the evaluation and interpretation of basic data and the preparation of the results for use or publication, as the case may be.

Further information, including the exact education, experience, and substitute provisions, is contained in the formal announcement. Announcements and application forms may be obtained from any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

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U. P. Superior Operations Centered at Clark Mine

The Union Pacific Coal Co.'s program of concentrating operations of its Superior (Wyo.) mining district at the new D. O. Clark mine is emphasized by the construction of the mine office building, warehouse building and general shop building in close proximity to the mine opening (*Coal Age*, June, 1941, p. 109). According to H. C. Livingston, chief engineer, the construction program now under way will complete the surface plant, all plant buildings being within a radius of 1,000 ft. of the surface opening to the D. O. Clark mine.

The mine office building, of brick construction and over-all dimensions of 32x48 ft., will house a general mine office, mine superintendent's office, engineering office, vault, and emergency first-aid room. The ambulance garage is to be built as an addition to the first-aid room. Of modernistic design, the building is to be heated by two-pipe low-pressure steam system, and the lighting will be of fluorescent type throughout.

The warehouse building, of semi-fireproof construction, 40x80 ft., will be next to and 30 ft. from the general shop building, saving trucking and unnecessary carrying of materials into the shop building. Heat will be supplied by a two-pipe system from a central plant in the shop building.

The general shop building, 72x100 ft., of fireproof construction, accommodates pit-car repair shop, welding shop, forge shop, electrical shop, machine shop and electrical substation. A feature of the layout is the ease of moving equipment being repaired from one shop to another by means of an overhead traveling crane.

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New Group Leases Coal Tract

The Hunter Coal Co., newly incorporated organization, has taken a long-term lease on about 5,800 acres of coal-bearing lands situated in Morris and Duncan townships, Tioga County, Pennsylvania. Samuel L. Shober Jr. is president; Mathias J. Gehen, formerly chief engineer, Philadelphia district, Reconstruction Finance Corporation, is general manager, and James G. Hogg, formerly of Philadelphia, is secretary-treasurer.

Work has been started for the company on construction of a new tipple and screening plant together with installation of a Roberts & Schaefer Stump Air-Flow cleaning plant with a capacity of about 1,000 tons daily. The company expects to begin drift mining in the Bloss seam with fully mechanized equipment and also plans the production of coal by stripping from the Cushing seam with outside contractors. An investment of about $100,000 will be made in machinery, equipment and general improvements.

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Susquehanna to Expand

The Susquehanna Collieries Co. has purchased 397.38 acres of land from the Middle Field Coal Co. and contemplates extensive mining operations. The lands are in the area between Maysville and Kulpmont Borough, Coal and Mount Carmel townships, Pa. Coal from the new colliery will be prepared at the Glen Burn breaker, in Shamokin. Construction work will be started soon.

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Trade Literature

AERODYNAMIC IMPELLERS FOR PUMPS—Peerless Pump Co., Los Angeles, Calif. Bulletin 148 describes Hydro-Foil propeller pumps for use in removing large volumes of water from sumps, deep wells, underpasses, cofferdams and for all dewatering and flood-control projects. Advantages from improved air-foil design are cited.

CONVEYOR BELT—B. F. Goodrich Co., Akron, Ohio. Catalog section describes functions of the new turntable conveyor belt and reasons for its patented design; gives details on construction and proper method of turning the belt.

DIESEL POWER—Caterpillar Tractor Co., Peoria, Ill. Booklet Form 6636 discusses problems solved by application of diesel power, dealing with savings effected in a multiplicity of fields, including mining and irrigation.

ELECTRICAL EQUIPMENT — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has released the following bulletins: DD-4063, giving new information on a.c. adjustable-speed drive; B-2278, describing coupled reduction gears for driving compressors, line shafts, generators, etc.; Descriptive Data 38–620, giving information on primary fuse cutouts; Descriptive Data 38–665, describing universal fuse links; Descriptive Data 39–400, containing application and construction details of switch and bus insulators; Bulletin B-2273, describing unitized switchgear; Data 8512.1, describing timestarters; Folder F-8571, discussing turbine-generators; Descriptive Data 33–216, giving new information on indoor oil circuit breakers.

ELEVATOR BUCKETS—Link-Belt Co., Indianapolis, Ind. Folder 1912, covering Link-Belt malleable-iron and Promal elevator buckets, gives dimensional data on units for general service, for resistance to abrasion, for severe service, for inclined elevators, and for handling clinging and lumpy materials.

FACE SHIELDS—Boyer Campbell Co., Detroit, Mich. Circular, "Protection for the Eyes and Face," features 20 different models of face shields, all interchangeable in parts with the exception of two.

FIRST-AID CABINET—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin FA-74 describes and lists materials contained in the new M.S.A. miners' first-aid cabinet, the lid of which is equipped with chains so that, when opened, it serves as a work shelf on which to lay out dressings.

HORIZONTAL DUPLEX PLUNGER PUMPS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-412-B30 gives features and specifications, and pictures installations of Types KLF, KKF and KMF horizontal duplex plunger power pumps.

INDUCTION MOTORS—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B-6132 covers not only standard motors but those with special protective features such as drip-proof, splashproof and inclosed designs. Included are tables giving general characteristics, and curves showing variations of power factors and starting torques with different motor rated speeds.

INDUSTRIAL JACKS—Duff-Norton Mfg. Co., Pittsburgh, Pa. Catalog 22 gives specifications on the company's complete line of over 300 types and sizes of jacks and lists equipment for every type of lifting, lowering, pushing and pulling application.

JACKS—Templeton, Kenly & Co., Chicago. Junior Catalog 41 shows jacks in innumerable types to multiply manpower, to relieve busy cranes and other handling equipment, and to simplify many jobs now being done "the hard way."

LUBRICANTS—Sun Oil Co., Philadelphia, Pa. Folder P-Q stresses the importance of added man-hours and machine-hours obtainable through the use of efficient petroleum products.

LUBRICATING SYSTEM — Stewart-Warner Corporation, Chicago. Bulletin Form 22–34 describes the company's progressive lubricating system centralized to permit high-pressure grease lubrication to any number of bearings on a given piece of industrial equipment. Designed expressly for large-scale industrial lubrication, it is said to feature simplicity of installation.

MINING EQUIPMENT—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B-6166 touches on the company's complete line of crushing, grinding, screening and other mining machinery including centrifugal pumps, blowers, compressors, texrope drives and related power and electrical equipment.

PACKINGS AND GASKETS—Johns-Manville, New York City. Catalog Form PK-12A gives detailed information on J-M packing and gasket styles, including handy recommendation tables designed to serve as a guide to proper packing selection for various types of equipment under diversified service conditions.

VIBRATING SCREENS—Protective Equipment Corporation, Chicago. Bulletin 441 tells how to do a better job of sizing, dedusting and dewatering of coal with Solectro vibrating screens, featuring positive adjustment of stroke to product.

WHAT'S NEW IN COAL-MINING EQUIPMENT

EARTH MOVER

Designed to meet construction needs of larger, long-haul earth-moving jobs, R. G. LeTourneau, Inc., Peoria, Ill., has introduced two new Super C Tournapulls. Powered by either a 130- or 150-hp. six-cylinder diesel engine, the Super C utilizes this extra power to increase the production per hour by pulling a Model LP Carryall with a struck capacity of 12.1 and a heaped of 15 cu.yd.

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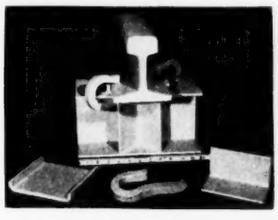
STEEL TIE

The Anchor tie, a new H-beam tie for use in mine and industrial tracks, of simple design, having only four loose parts, has been developed by Bethlehem Steel Co., Bethlehem, Pa. The gage of the track is definitely fixed at the place of manufacture by two double-shouldered $\frac{3}{8}$-in. tie plates $5\frac{1}{2}$ in. wide, arc-welded to the 6-in. H-beam, which is 8



ft. long and weighs $15\frac{1}{2}$ lb. per foot. Four 3x3x$4\frac{1}{4}$-in. angles are arc-welded directly beneath the tie plates between the two flanges of the beam, to act as stiffeners and retainers for the spring clamp. The combination of beam, tie plate and angles forms a stiff pedestal construction at the point of maximum load. The spring clamps have enough "give" to create resiliency in the whole track structure, thereby eliminating any of the detrimental effects that a rigid pedestal might have. Due to the reinforcing effect of the welded tie plates and angles, the completed tie has unusual strength for a lightweight construction. There are no holes, notches, etc., punched in the tie section to weaken it at any point.

The rails are fastened to the ties by means of clamps of heat-treated spring steel, four clamps for each tie. The clamps are driven into place with an ordinary spike maul or sledgehammer. As the hook end is driven into place at the base of the rail, the other end of the clamp snaps over the corner of the angle, a hump near the end preventing the clamp from slipping back. To further lock the clamp into position, the end engages the web of the tie, forcing the hump firmly against the angle.

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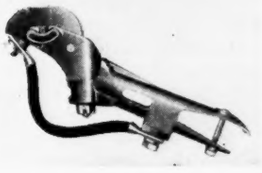
TROLLEY SHOE AND CABLE CLAMPS

Ohio Brass Co., Mansfield, Ohio, announces development of a new shoe or glider for collecting current from standard trolley-wire overhead systems, designated as the Type L. Recommended for use on locomotives which require more current-collecting capacity than is provided



by trolley wheels or light shoes, the Type L shoe is cast in one piece. Perhaps its outstanding design feature is the method of mounting the shoe in the harp. The pivotal center of the shoe is in the center line of the wearing surface. With this location as a pivot point there is no tendency for the shoe to tilt because of the friction between wire and shoe. Consequently, the shoe always is held with the full length of contact against the wire whether the locomotive is standing still or going in either direction.

Completing its line of suspension end strain clamps for hollow copper cables, O. B. now has suitable designs for any type, size or make of cable. These clamps meet the recommendations and requirements of copper-cable manufacturers. Strain clamps for hollow copper cable

include the principal design features of the company's standard clamps, known as Hi-Lites. Clamp bodies and fittings are made of malleable iron, Flecto-processed to prevent embrittlement during galvanizing. Nuts, bolts and rivets are of steel. Iron and steel parts are hot-dip galvanized. Copper liners are furnished with all calmps.

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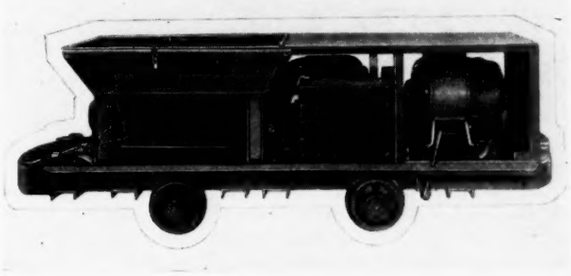
ROCK-DUST DISTRIBUTOR

Mine Safety Appliances Co., Pittsburgh, Pa., offers a new high-pressure rock-dust distributor that features a high discharge rate and simplified construction. The new design, listed as Type "S," is made in several models. The unit discharges at least 225 lb. of dust per minute through a 4-ft. section of hose; between 90 and 100 lb. per minute through 500 ft. of hose.

The patented screw feeder carries rock dust from the hopper into the aeration chamber, where it is mixed in correct proportion with air from the blower, and enters the hose. An important feature is a "dust plug" which prevents air from blowing back through the hopper. The mechanism has no bearings exposed to rock dust and no parts that require periodic adjustment.



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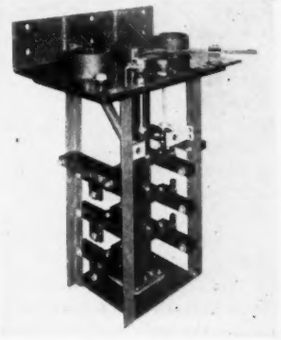
DISCONNECTING SWITCH

In response to demand for a disconnecting switch which can be applied safely in explosive and corrosive atmospheres, General Electric Co., Schenectady, N. Y., has developed an oil-immersed unit. Designated as Type SF-1, the device is available as an inclosed triple-pole single-throw group-operated disconnecting switch in the 5,000-volt, 600-amp, rating. It is for use indoors or outdoors as an isolating device for oil circuit breakers or motor starters.

All terminals and connections are at least 6 in. under oil, and double-break contacts with ample clearances are used. The op-



erating lever, which may be locked either open or closed, gives positive indication of switch position. Design of the operating-shaft assembly is such that it will withstand more torque than can be applied on the operating lever by one man without the use of an extension lever.

An interlock on the operating lever prevents opening of the switch under short circuit or load. The operating lever is released and the switch may be opened only when an interlock button is depressed. This operation actuates an auxiliary switch in the housing which is connected to trip the starting equipment in the circuit. An interlock bar on the tank prevents removal of the tank with the switch closed or the line side of

the switch energized. The tank interlock bar can be removed by unscrewing the plug through the bar only after the switch is opened. The unscrewing of the plug actuates an auxiliary switch which is connected to the trip line circuit breaker. Cable clamps prevent deflection of the cables under short circuit.

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SPACE-SAVING SWITCHES

Where space is an important factor the Delta-Star Electric Co., Chicago, recommends its two-insulator horizontal center-break switches as advantageous for group switches; over-all length is less than three-insulator types, and shorter blade permits closer phase spacing than two-insulator single horizontal break switches having blade full length between insulators. According to the manufacturer, the 2,000-amp. 23-kv. Type PM-22 switch is one of the easiest to operate because both blade portions open on the same side of the channel base, causing a combined shearing and twisting action for breaking ice or corrosion.

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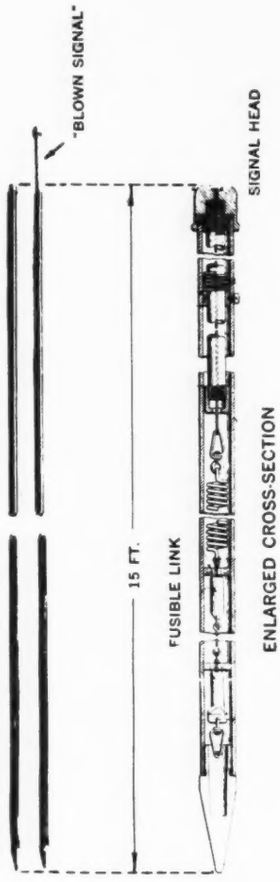
CYLINDER TRUCK

A new hand truck designed to carry an oxygen cylinder, an acetylene cylinder, and a complete welding and cutting outfit is offered by the Linde Air Products Co., New York City. Known as the Oxweld T-7 two-wheel welding truck, it is light in weight, well balanced, and has 14-in. wheels equipped with semi-pneumatic rubber tires. It weighs considerably less than the former all-steel-wheeled trucks which it replaces. The new design results in a 4½-in. reduction in over-all width, permitting passage through narrower openings. As an added feature, the size of the removable metal tool box for extra blowpipes, tips, goggles and wrenches has been increased.

HOT-SPOT INDICATORS

With industrial and other users of bituminous coal beginning to build up storage piles, Coal Specialties Co., New York City, announces improvements in its hot-spot indicators. These units



signal when a danger point in temperature has been reached requiring that something be done before spontaneous combustion starts. The improvements make it possible to provide links which "blow" at 125 and 180 deg. where these two temperatures may be necessary. Ordinarily, however, the one that is most generally considered acceptable for average conditions will blow at 150 deg.

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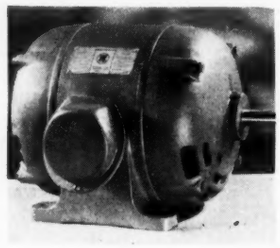
AIR-COOLED TRANSFORMERS A.C. POWER UNIT

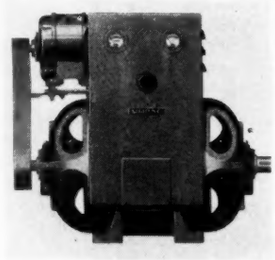
An advanced design of air-cooled transformers said to provide an unusually high factor of operating safety is offered by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. With 60-cycle ratings ranging from 150 to 500 kva. inclusive for single-phase and 150 to 1,000 kva. inclusive for 3-phase, voltages 13,200 and below, Type ASL transformers are designed specifically for installations in buildings where safety is essential. Because no fire and explosion hazards are possible with this design, substantial savings



are obtained by elimination of protective vaults. Improved regulation and increased output are obtained because these units may be located near the load center, thus permitting short secondary cable runs.

The housing is constructed of expanded metal finished in a black baked-on moistureproof enamel which permits a free and easy flow of air from all sides and provides safety against accidental contact with live terminals. The primary and secondary coils are separated by liberal air spaces through which a stream of air constantly circulates. The windings are designed for a 75-deg. temperature rise under continuous full-load operation. Heat-resisting insulation, including porcelain, asbestos, mica, glass and air (inorganic materials), are used throughout, allowing operation at higher temperatures than are permissible with liquid-filled transformers.

A new and completely self-contained a.c. generating unit which regulates, controls and meters its output also is announced by Westinghouse. Called the "Simpac" power unit, it combines a standard open-type



a.c. generator, a d.c. exciter, exciter field rheostat, voltmeter, ammeter, and optional voltage regulator in one integral unit. The "Simpac" was designed especially for use in out-of-the-way localities or for special requirements in industrial plants. It may be either engine- or electric-motor-driven, direct- or belt-connected.

Ratings from 3.75 kva. to 187 kva. are available in voltages of 120/208, 240 or 480, with operating speeds from 600 to 1,800 r.p.m. Units above 187 and up to 312 kva. may be obtained with separately mounted controls. All come wired and assembled.

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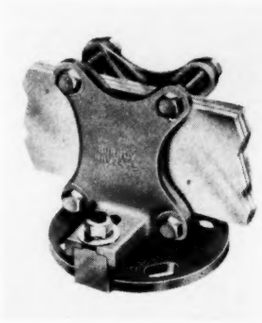
BUS SUPPORT CLAMP, HOTTAP

In order to simplify the installation of flat bar bus structures, Burndy Engineering Co., New York City, offers the Type HHV bus support clamp. This unit supports the flat bar vertically and the same clamp may be used to hold one or more flat bars. If the supporting insulator is slightly out of line with other insulators a "slide track" in the clamp permits compensation so that the flat bar itself remains straight and true, without any stresses thereon tending to distort



it. Both of the clamping plates which grip the flat bar are securely fastened to the base so that any short-circuit stresses are divided over both parts and are not concentrated on a single supporting part. The new clamp is made of high-strength aluminum bronze and is available for any number of bars of 1½- to 12-in. width.

Burndy also offers a newly designed hottap for taking taps from either cable or flat bar. This connector is said to have a broad field of application: it may be used for grounding, temporary taps and jumping equipment being repaired or replaced.